SCIENTIFIC AMERICAN

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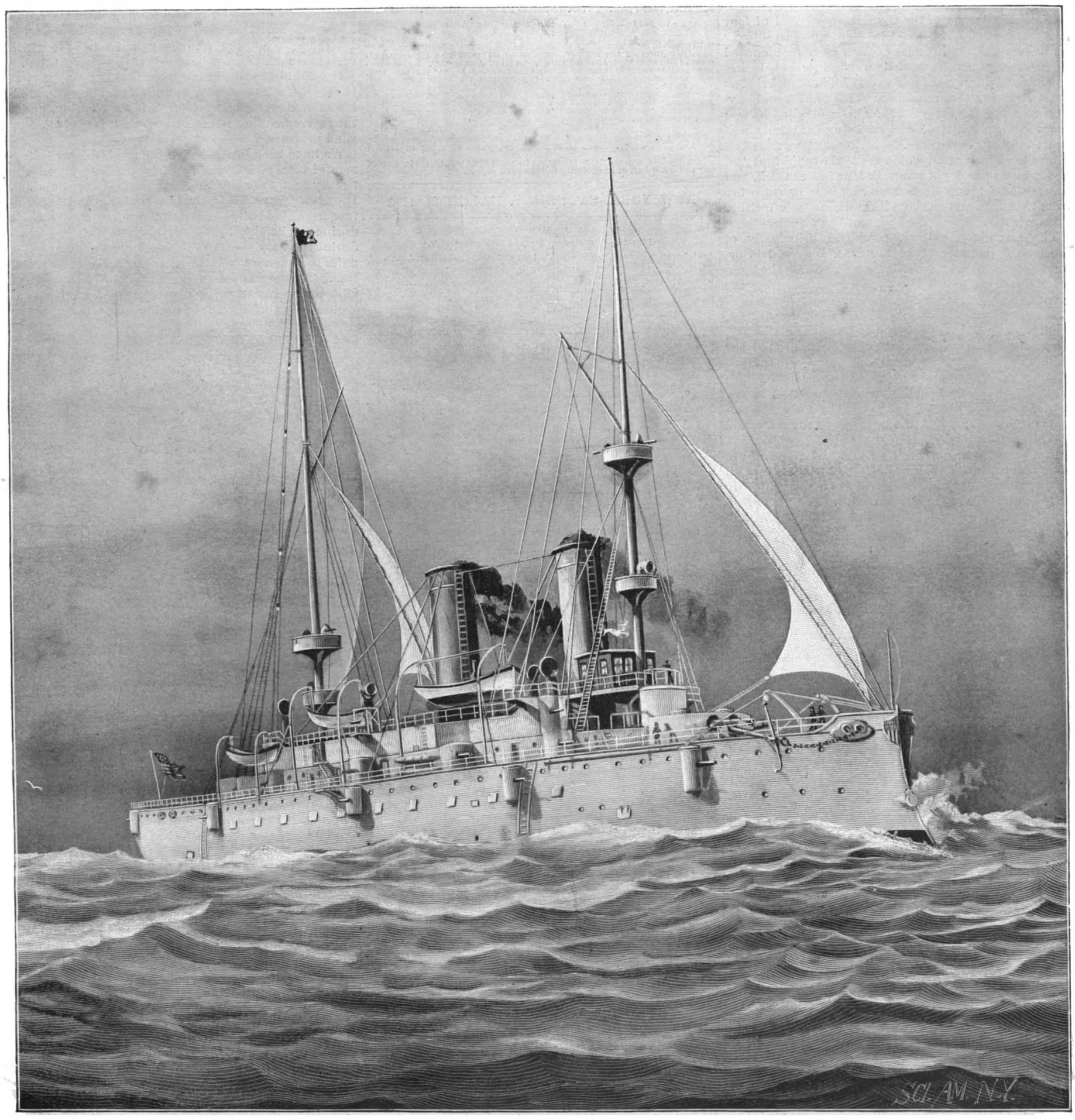
THE UNITED STATES PROTECTED CRUISER OLYMPIA.

There is a certain respect in which the Olympia can easily challenge comparison with any other protected cruiser either in our own or in any other navy of the world. There is no other ship which can show on a given displacement so high a development of the various qualities which go to make up the efficiency of this type of warship.

The science of warship design, as has been frequently pointed out in the SCIENTIFIC AMERICAN, is largely a matter of compromise. When the naval designer sits down at his board to plan a new ship, there is one quantity—the displacement—which is written down before all others; and within the limits of this quantity he makes his distribution of weights. He allots so much to hull, so much to machinery, so much to guns, armor, stores, and all the minor fittings which will sink the completed ship to her designed load line.

The genius of the designer will be shown in the manner in which he distributes his weights; and the most successful ship will be that which secures a high all-around efficiency without the sacrifice of any one essential feature. It would be an easy matter, comparatively, to build a ship which should be at once the fastest, best protected, most heavily armed, and have the greatest coal endurance of any ship in the world—provided there were no limit upon displacement. The Columbia can steam 23 knots against the Olympia's $21\frac{68}{100}$ knots; but to get this 1½ knots of extra speed she has had to sacrifice her offensive power to such an extent that she would be an easy prey to the smaller ship in a naval duel. Judged by the ships which have lately been produced, the United States designers are considerably ahead of those of foreign navies in their ability to turn out ships with an all-around efficiency. There is only one firm, the famous Armstrong Company, of Newcastle, England, that equals them in this respect. A comparison of the Olympia with the new Eclipse class of British cruiser,



THE UNITED STATES PROTECTED CRUISER OLYMPIA.

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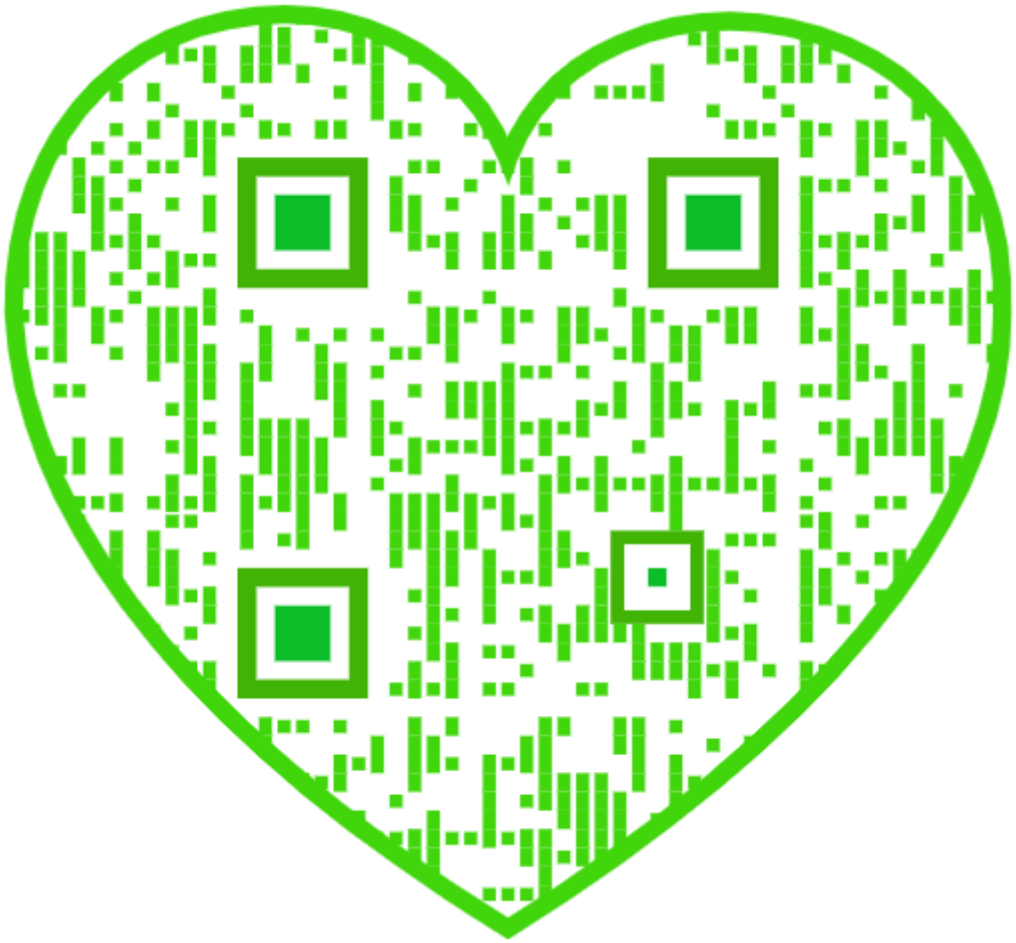

and with the Blanco Encalada, built by Armstrong & Company, will show this very clearly.

	Displacement.	Horse power.	Speed.	Protective deck.	Normal coal carried.	Armament.
	Tons.			Inches.		
Olympia	5,800	17,363	21·68	4¾ to 2	400	Four 8 in., ten 5 in. quick fire, fourteen 6 pounders, ten light guns.
Eclipse	5,600	9,600	19·5	2½	550	Five 6 in. quick fire, six 4·7 in, quick fire, eight 3 in. quick fire, six light guns.
Blanco Encalada	4,400	14,500	22·78	4 to 1¾	900	Two 8 in., ten 6 in. quick fire, twelve 3 in. quick fire, twelve light guns.

The great superiority of the Olympia over the Eclipse on every point of comparison cannot be attributed to the extra 200 tons displacement of the former; and the comparison is even yet more puzzling when we substitute the Armstrong cruiser for the Olympia. On 1,200 tons less displacement than the Eclipse, the Blanco Encalada carries a heavier armament at three knots higher speed.

The main battery of the Olympia, composed of four 8 inch and ten 5 inch breech loading rifles, is entirely on the main deck. The four 8 inch guns are mounted in pairs in two turrets of Harveyized steel 3½ inches thick, revolving within barbettes of 4 inch nickel steel armor. Firing through an arc of 280 degrees and having an axial height of 22 feet, these guns have a great range of action, besides being unusually well protected from return fire.

The ten 5 inch guns, which are of the rapid fire type, are housed in armored sponsons four inches thick, and are so placed that they give a direct bow or stern fire from four guns and a broadside discharge on either side from five.

The secondary battery, composed principally of fourteen 6 pounder rapid fire guns, is stowed in armored sponsons on the berth deck and along the hammock berthing above the 5 inch guns, affording the greatest convenient range and command. The disposition of the 6 pounders on the berth deck is such that, while free from the flash of the main battery above, they may maintain a complete belt of fire around the ship. The six 1 pounders and the four Gatling guns, which constitute a minor phase of the secondary battery, are distributed in the fighting tops and at advantageous points on the bridges. There are five torpedo discharges; one at the bow, one at the stern, and two on each broadside.

From a commanding position just abaft and above the forward turret, the commanding officer, incased by five inches of nickel steel, will bring his ship into action; and the most modern means of communication bring every important point within immediate touch.

The principal dimensions are:

Length on water line	340 feet.
Beam, extreme	53 "
Draught, mean	21 " 6 inches.
Displacement, normal	5,800 tons.
Coal supply, normal	400 "
Coal supply, bunker capacity	1,093 "

The vessel has twin screws, each shaft being driven by its own vertical, triple-expansion engine. While not admitting strictly of comparison, the Olympia and the Minneapolis have engines individually alike, one having two sets and the other three. On trial, the Minneapolis developed 21,000 horse power, a proportion of 7,000 for each engine, and the Olympia developed 17,313; over sixteen hundred horse power more in each engine than was realized by the larger craft.

The contract called for only 13,500; and the difference between that and the trial result is indicative of the wide margin of safety reserved by the government and upon which the contractors, at their own risk, are willing to encroach when a premium of $50,000 is placed upon every quarter knot of speed in excess of contract requirements.

Miscellaneous Notes.

It has been suggested that the boards of health of large cities require the wheels of all milk wagons to be equipped with rubber tires.

A car load of redwood has been recently sent to Nuremberg, Germany, for use in making lead pencils. California redwood and cedar are about the only woods used in the manufacture of pencils, and the European forests, from which the pencil wood supply was formerly obtained, have become exhausted.

The Albert Levy prize, of the value of $10,000, has been awarded by the Academy of Medicine to Drs. Behring, of Berlin, and Roux, sub-director of the Pasteur Institute in Paris, for their discovery of the means of curing diphtheria.

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STABILITY OF LOFTY BUILDINGS.

Although the exaggerated vertical proportions of the modern office building render it, architecturally speaking, somewhat grotesque, there is no doubt but that the steel "skeleton" system upon which it is built provides all the necessary rigidity and strength. The vast areas of towering wall which these buildings present to the wind naturally raise the question of their ability to withstand the accumulated pressure which must result when they are exposed to a gale of any strength.

The vibration of lofty buildings has ever been a favorite theme with those who write in the field of engineering romance.

The party who, not so long ago, gravely assured the public that the lantern at the top of the Eiffel Tower swept to and fro through an arc of ten feet, in response to the fiercer gusts of a storm, was shortly afterward followed by another writer, whose pen, more given to fluency than to fact, wrote down a detailed account of the vibrations of a certain well known office building, which were described as being so severe as to stop the clocks on any but the lowest stories! Factory chimneys, church steeples, lofty monuments, and in fact every structure that raises its head much higher than its fellows to the buffeting of the elements, are locally credited with feats of more or less impossible vibration.

That tall factory chimneys do sway to and fro in a high wind, and that a poorly constructed building will rock, can be proved by careful instrumental tests, and in extreme cases the motion can perhaps be detected by the eye, but the frequency and extent to which such movements occur has been vastly exaggerated.

It would be natural to suppose that the elasticity of the steel framework of a fire proof building would allow of a certain amount of "give" or spring, under the severe bending stresses to which it is subjected by wind pressure.

We have been favored with the result of an instrumental test, which was recently carried out on the twenty-first floor of the American Surety building, Broadway, New York, by the engineer and superintendent of the building, Mr. J. Turner. It was made during the height of the heavy storm which prevailed during January 4, when an official wind velocity of 82 miles per hour was registered in the neighboring station. The test failed to give the slightest evidence of vibration; a result which agrees with the testimony of the inmates that in a gale the topmost floors are as still as the first stories. The test was made with transit and level, and though it was not a test of the highest instrumental character, the result was remarkable, for both the plumb bob and the bubble remained perfectly still, even when the building was struck by the heavier gusts of wind.

We confess to some surprise at this practically absolute rigidity; for the absence of any building on the opposite side of Broadway, and, indeed, on that part of the whole block which lies immediately in front of the Surety building, makes it certain that practically the full height, from curb to coping, was exposed to the shock of the storm. Just how great was the bending strain set up within the building is a matter of easy calculation. The front exposed to the wind is 84 feet 8 inches wide by 314 feet high, giving a total of 26,585 square feet. The wind pressure corresponding to 82 miles per hour is somewhat problematical, for, although experimentalists have discredited Smeaton's formulæ, they have given us no substitute upon which they are well agreed among themselves. Smeaton gives 31 pounds per square foot as the pressure corresponding to 80 miles per hour. This is undoubtedly too high. Prof. Martin's formula, pressure $= 0{\cdot}004V^2$, works out at about 25 pounds to the square foot, which we will assume to have been maximum pressure on this occasion.

This gives a pressure on the whole front of 332 tons; and a bending or overturning moment of over 52,000 foot tons. These figures give us an impressive idea of the solidity of a construction which proves to be quite insensible to such powerful disturbing forces. It must be due to the combination of a thoroughly well riveted steel structure with the inertia and rigidity of massive walling, into which it is tied and built.

REPORT ON THE PLANS FOR NEW YORK RAPID TRANSIT.

The Supreme Court Commission, consisting of Frederic R. Coudert, George Sherman, and William H. Gelshenan, which was appointed to examine and pass upon the plans of the New York Rapid Transit Commission, has reported unequivocally in favor of the construction of the underground railroad on the lines proposed by Engineer Wm. B. Parsons.

It is evident, from the general tone of the report that they have judged the question as to whether the tunnel should or should not be built from the standpoint of general expediency, having in view the greatest good of the greatest number. The question which the commission set itself to answer was, whether the necessity for increased transit facilities existed and, if so, whether the proposed scheme would meet the necessity, and confer a public benefit upon the city

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which would outweigh any possible temporary or permanent disadvantages which might attend its execution. They decided that the necessity exists, and that the benefit conferred upon the public at large will vastly outweigh any temporary and local inconvenience. With regard to the discrepancy between the estimate of $50,000,000 for the total cost by Mr. Parsons and the $80,000,000 estimated by engineers who testified for the protesting property owners, the report says: "In the view of your commission, it is not necessary to determine whether the road will cost $50,000,000 or $90,000,000. We are convinced that, if the road can be built at a reasonable cost, it ought to be built. We are equally convinced that we can never know whether it can so be built until an opportunity is given to competent contractors to say whether they will or will not undertake the construction of the road."

Regarding the encroachment by the tunnel upon the sidewalk vaults and the question of possible damage to existing structures, the commissioners say: "We think that this is one of the cases where the public interest cannot be barred in its progress by any regard for persons where a violation of the law is not involved. If the owners have no law in their favor, and if the public convenience demands that the vaults shall be taken, the hardship of the case cannot be suffered to interfere: the demands and the comfort of 2,000,000 people must be heeded."

Regarding the apparently all important question as to whether the roads would pay, the commission sees no reason to doubt that they will. "Our invariable experience," they say, "thus far has been that the facilities for transit never increase so rapidly as to meet the growing necessities of travel." The commissioners are prepared to admit that when the road is built travelers may at first be prejudiced "against a system which compels them to go down a long flight of steps and to hide themselves from the sunshine and the open air for a given length of time." In regard to this objection, we have already pointed out in a previous issue that it would probably exist at the outset; but we are, at the same time, of the opinion that, if the tunnel could be built and the proposed speed of operation maintained, the New York public would ultimately smother its sentimental objections in the face of the solid practical benefits which such a scheme would bestow.

The strong indorsement of the rapid transit scheme by a commission of such great ability and high personal character is certain very materially to hasten its execution; but it seems likely, on the other hand, that the legal complications in which the opponents of the Commission will endeavor to involve the proceedings will bring about a delay which may prove to be of considerable duration. When the legal objections have been swept away (supposing, as the commission consider, that they are invalid), there will remain a period of five years which must elapse before the roads can be put in operation.

Pending the arrival of the day of opening, which may possibly be six or seven years distant, what provision is to be made for relief of the existing overcrowding, not to mention the additional increase in travel which is certain to take place in each year of the interim? We understand that the Rapid Transit Commission invited the elevated roads to make a statement as to what they were prepared to do in the way of extension; but although they appeared before the commission of 1891, at the present writing they have made no application or response to the existing commission of 1894.

As far as the needs of the public are concerned (and the special commission is right in stating that this is the first consideration), the extension of the existing elevated roads, and the construction of the Broadway tunnel, should be regarded as parts of one general scheme. A scheme which contemplates the provision of the New York lines of travel with ample seating capacity at all hours of the day must necessarily embrace both enterprises. From 1884 to 1893 the travel on the elevated roads increased 250 per cent, and this in spite of the fact that in the same interval there was a rapid increase in the travel upon the competing surface roads. Statistics show that the rate of travel increases faster than the population; that is to say that not only are there more people to travel, but each person takes more trips each year than he did in the year preceding.

It should be borne in mind that in estimating the probable needs of the future no calculation can be considered reliable which is not based upon seating capacity. Statements of the number of people which a road can carry from a given station in a given time are often worthless, for the reason that 30 or even 50 per cent of this number may be standing passengers.

If to-morrow the elevated roads and the Broadway cars were obliged by law to hang out the French sign "Complet," as they do in Paris, when all seats were filled, what would become of the morning and evening travel? Yet the passage of such a law would be merely the recognition of the right of a passenger to demand that the transportation companies shall live up to their contract and give him the seat for which he has paid. In estimating the future transportation necessities of New York, provision must be made for the greatly enlarged accommodation which the operation of this law will demand.

A NEW COPYRIGHT BILL.

At a meeting of the executive committee of the American Publishers' Copyright League, the following resolutions were presented and adopted:

Resolved, That the American Publishers' Copyright League disapprove, on the following grounds, of the provisions of the bill introduced in the House of Representatives by Mr. Treloar (H. R. 5,976) for the revision of the copyright law:

1. The bill provides for the restriction to "citizens of the United States" of the privilege of securing copyright under the statute. The act of 1891 extended the privilege of securing copyright within the United States to the citizens of foreign states which conceded to American citizens the benefit of copyright. The act of 1870 had limited the privilege of securing copyright to persons who were "residents" of the United States. The restriction now proposed, limiting the copyright privilege to citizens, would bring about a revocation or cancelation of the copyright relations which have been entered into by the United States under the act of 1891 with Great Britain, France, Germany, Italy, Belgium, Switzerland, Spain, Portugal and Denmark, and would constitute a distinct step back of the policy of even our most primitive copyright laws in the recognition of literary and artistic property.

2. The bill provides for the addition to the list of articles which, in order to secure the privilege of copyright in the United States, must be wholly manufactured within the limits of the United States, of musical compositions, and of reproductions of works of art in the form of engravings, cuts, or prints. In the discussions of the provisions of the act of 1891, it was held by those having expert knowledge of the subject that the application of the manufacturing requirement to the production of foreign musical composers would in practice prevent such composers, in the majority of cases, from securing the benefit of American copyright, and would simply perpetuate the practice previously existing of the appropriation by American reprinters of the property in such productions. It was further established, during this discussion, that a condition requiring the manufacture or production in the United States of an engraving of a work of art by a foreign designer must, in the majority of instances (and particularly in the cases of the more important works of art which could not be brought across the Atlantic for the purpose of being engraved), render impracticable the securing of American copyright, and would leave open, as heretofore, the property in such reproductions to be appropriated by unauthorized publishers.

In connection with the difficulties in the way of securing simultaneous publication in the United States for editions of Continental books printed in the language of the country of their origin, the authors of France, Germany and Spain have thus far received but inconsiderable advantage from the American copyright act, although the several nations which have entered into copyright relations with the United States have extended to our citizens, without any restrictions of local manufacture, the full copyright privileges enjoyed by their own citizens. This result has naturally brought about, on the part of the nations referred to, a large measure of dissatisfaction with their copyright relations with the United States, and these relations would before now have been terminated (greatly to the disadvantage of American authors and artists) if it had not been for certain advantages secured under the act of 1891 to the foreign producers of works of art. If the protection of American copyright is to be withdrawn also from the productions of foreign artists (as would be the result under the Treloar bill), international copyright relations between the United States and the nations above specified will inevitably be brought to a close.

3. The provision in the bill under which the total amount to be collected for the infringement of the copyright of a literary production is limited to $5,000 is inequitable in itself, and constitutes a distinct departure from the principles heretofore controlling the law of copyright throughout the world. An unauthorized reprinter might easily secure, through the appropriation of copyrighted work, proceeds which would enable him to pay such a penalty as that provided for, and still secure a satisfactory return from his undertaking. The penalty should be left, as under the present law, proportioned to the extent of the injury caused to the owner of the copyright, and proportioned also to the proceeds secured to the person appropriating the copyrighted property, which proceeds have been diverted from the rightful owner.

4. The plan for instituting the office of Commissioner of Copyrights can, in our judgment, be dealt with more effectively in a separate bill, such as has already been introduced in the House by Mr. Bankhead and in the Senate by Mr. Morrill. It is further our opinion that the staff provided under the Treloar bill for the Copyright Bureau would be unnecessarily large and expensive, and that the services of so many employes would probably not be required, at least during the earlier years of the operation of the office.

5. The purpose expressed in Clause XXVIII of the bill for securing adequate protection for the property rights of dramatic authors can also, in our judgment, be better brought about under the provisions of the Cummings bill now pending in the House of Representatives.

For these several considerations it is our judgment that the enactment of the Treloar bill would constitute a serious injury to the rights of producers of copyright property and to the interests of the community for the use of which such copyright property is brought into existence. It would further constitute, on the part of the United States, a breach of international good faith with the several nations of Europe that have extended copyright privileges to American citizens. We therefore ask that the bill may receive the unfavorable action of the Congress and of the executive.

A resolution was passed, however, approving the bill in the House by Mr. Bankhead and in the Senate by Senator Morrill for the establishment of a separate bureau for the registration of copyrights.

Spain's Big Meteorite.

In our issue of February 22 we called attention to the bursting of a great aerolite over Madrid on February 10. The Spanish newspapers have now reached this country and give full details of the event. This phenomenon is seldom observed on so startling a scale. The sky was cloudless, the streets were just beginning to be thronged with traffic and pedestrians, when the deafening sound of the explosion was heard. Those who happened to be looking at the sky say that the instant of the explosion there was a vivid glare of blinding light that for the moment outshone the sun, and then there instantly appeared at the place where the disturbance originated what looked like a cloud of white and bluish tint, bordered with red, which moved east at a tremendous rate, leaving behind a thin train illumined by the sun that may have been dust particles. The whole city appeared to be shaken as if by an earthquake, and the agitation of the atmosphere was shown by the rapid fall and rise of the barometer. The terror inspired by the occurrence was very great, particularly among the ignorant and superstitious. Many people did not recognize the origin of the phenomenon and thought some terrible catastrophe had occurred. The energy of the disturbance probably equaled that of the explosion of a large powder magazine. Many windows were shattered and walls injured, but fortunately no one was killed. The aerolite was visible over at least three-fourths of Spain as it shot through the air above the peninsula. Some damage was done at places along its route, for the great meteorite partly disintegrated on its way and the incandescent fragments that showered upon the town of Lograno set two buildings on fire, and at Burgos three fragments fell among the houses. Other pieces of the stone that were flung off near Madrid were picked up while still hot.

The Marvels of an Ostrich's Stomach.

The post mortem examination of one of the flock of ostriches owned by Barnum & Bailey, which has been on exhibition at the Central Park menagerie, New York City, gave the spectators a wonderful object lesson of the digestive capabilities of an ostrich. The ostrich was dissected by a taxidermist. He found the following articles in the bird's stomach: One wooden clothes pin; the bottoms of two beer bottles; a mouth harmonica, five inches long and two inches wide; a ferrule of an umbrella with a piece of the stick in it about four inches long; a metal skate key; a brass door key, five inches long; a woman's black horn comb; two pieces of coal; a woman's silk handkerchief; three stones about an inch thick, together with some cabbage, grass, lettuce, celery and considerable dirt. Strange to say, the ostrich did not die of indigestion, but from tuberculosis. The bird will be mounted in the museum and it would be interesting to preserve alongside the collection of objects which was found in its stomach.

Lieut. W. C. Babcock, U. S. N.

Lieut. Babcock, executive officer of the U. S. revenue cutter Michigan, died of pneumonia at the University Club, New York, on March 11. He was born in Vermont, in 1853, was graduated at Annapolis in 1871, and from that time had been continuously in the naval service. He served under Capt. Rogers, inspector of this lighthouse district, and was largely instrumental in establishing the electric light buoy system of New York Harbor, which was illustrated and described in the SCIENTIFIC AMERICAN last week. The disease of which he died was of but ten days' duration, and was contracted while doing compass duty.

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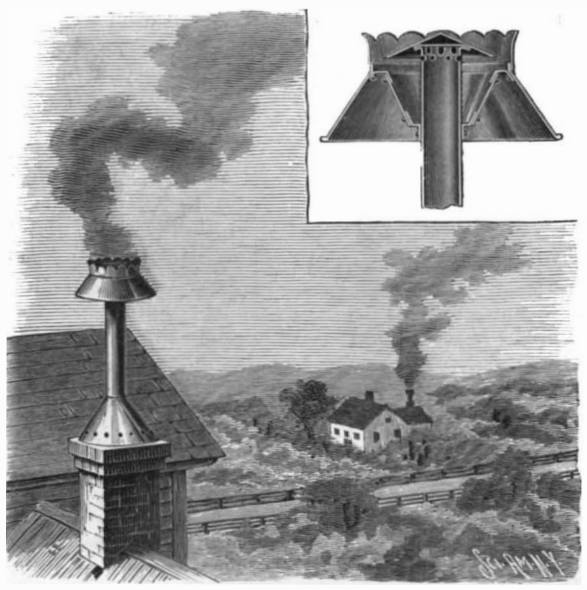
A NEW CHIMNEY COWL.

The lower end of the vertical draught pipe, according to this improvement, has a conical base portion adapted to be secured on the chimney top, and at its upper end, as may be seen in the sectional view, are draught apertures, a flat cap plate fitting over the upper end of the pipe, on which is also riveted a projecting conical shell or hood. A lower hood or shell, also of conical form, encircles and is supported on the draught pipe by means of angular braces held in place by rivets. The two shells are surrounded by a hood which



DE LANOY'S CHIMNEY COWL.

has an upper straight portion and a lower coned portion, and is held in place by braces or brackets secured to the lower shell. The improvement has been patented by John M. De Lanoy, of No. 15 John Street, Tarrytown, N. Y. When the device is in place on the chimney, an air current from either side is deflected by the encircling hood, and prevented from blowing down the chimney, although drawing along with it the smoke issuing from the apertures of the draught pipe, and thus increasing the draught. Both ascending and descending air currents are likewise deflected by the shells, and the cap plate on the upper end of the pipe, between it and the shell, prevents the formation of eddy currents and the collection of soot.

To Prepare a Transparent Mirror.

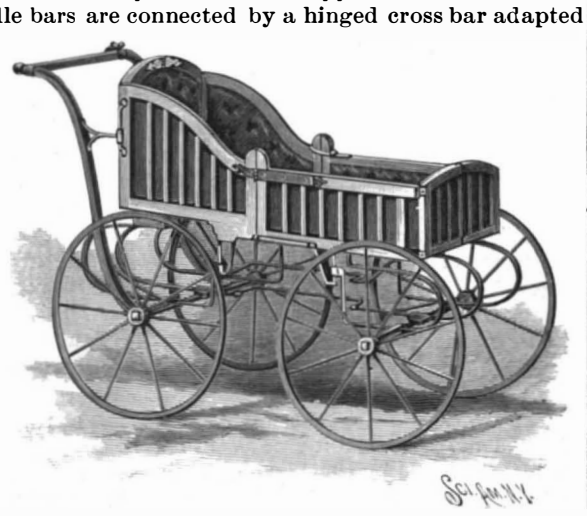
The following process (Neuste Erf. u. Erf.) for producing a mirror which reflects from one side, but is transparent from the other, has been patented in Germany: Dissolve 1 part by weight of silver nitrate in 10 parts by weight of water and label No. 1. Prepare another 10 per cent solution of silver nitrate, but in larger quantity; to this add ammonia water, drop by drop, stirring carefully until the precipitate formed at first is completely dissolved, and label No. 2. Now add solution No. 1 to solution No. 2 until the odor of ammonia is no longer recognizable and the liquid has again become very turbid. Now add 100 parts by weight of distilled water for every part of silver nitrate originally used in solution No. 2, and filter until clear. Label this No. 3. Prepare a reducing solution by dissolving 0·8 part by weight of Rochelle salt in 384 parts by weight of distilled water, boil, and to the boiling solution add gradually a solution of 3 parts of silver nitrate in 10 parts by weight of distilled water, and filter when cool, and label No. 4. Clean the glass to be coated thoroughly, lay it on a perfectly level surface in a room at a temperature of about 25 degrees C. (77 degrees F.) Mix equal parts of No. 3 (the depositing fluid) and No. 4 (the reducing fluid) and pour over the glass. The glass may, if preferred, be dipped into the solution. The time required for the deposition of the layer of silver of just the correct thickness has to be determined by the judgment of the operator in each case, and this may be aided somewhat by observing a piece of white paper below the plate of glass. When a sufficient deposit of silver has been made, and much less is required than for an ordinary mirror, pour off the silvering liquid and rinse thoroughly with the distilled water, and stand the mirror on edge to dry; coat the silvered side with a solution of colorless shellac in alcohol and finally frame the mirror with a backing of clear glass to protect the mirror surface from being scratched.—American Druggist.

Education in Japan.

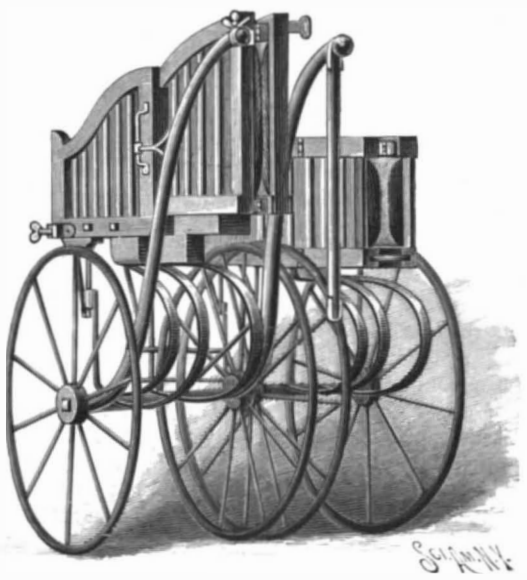
The calendar of the Imperial University of Japan in Tokyo for 1894-95 shows depth and strength in the older faculties and departments and bright promise in those that are newer. In December, 1894, there were 1,468 students in the various colleges of law, medicine, engineering, literature, science, and agriculture. Taking the year 1878 as that in which the previously existing school reached the grade of a European university, we find that 781 graduates in full course (not counting 152 deceased persons) have gone into active life well prepared for varied usefulness. The evident thoroughness of the curricula in the newer departments of science and agriculture, and the happy combination of the theoretical and practical, are striking facts in the higher education as here given. The eighteen pages which set forth the titles and contents of scientific monographs, mostly by native authors and investigators, are also very suggestive. Almost every department of human knowledge, with its appropriate apparatus of books, instruments, laboratories, and observing stations, is organized in this Teikoku Daigaku (Imperial University of Japan). To study this modest pamphlet in the perspective of the past quarter of a century, the Evening Post adds, is to understand largely the secret of Japan's life and power on the threshold of the year 1896.

AN IMPROVED FOLDING BABY CARRIAGE.

The illustrations represent a baby carriage which may be folded both longitudinally and laterally, the construction being strong and simple and the changes to the different positions easily effected. The improvement has been patented by George Mayer, No. 117 East One Hundred and Fifth Street, New York City. Each axle comprises four members, the end members comprising spindles and hub flanges, and the inner members having projections received in recesses in the end members, by which the axles are prevented from excessive swinging movement when extended. The inner ends of the inner axle sections are pivotally mounted in blocks to which are connected end sections of an axle coupling connecting the front and rear axles, the coupling consisting of two sections and folding centrally. Mounted on each outer axle section and each of the central pivotal blocks is a bowed spring, the upper portions of the springs being secured to the under side of the carriage body, the outer springs being rigidly attached and the central ones having pivotal movement when the carriage is folded. Fixed to each of the outer axle sections are also brace rods on which are sleeves slidable on depending hangers secured to the underside of the carriage body, the braces moving inwardly with the sections of the axle as the carriage folds. The carriage body has hinges in its side portions and in the bottom and ends, constituting four sections arranged in pairs, so that they may fold first on the longitudinal line and then break in the middle and fold on a transverse hinge, as shown in one of the illustrations, the sections when being opened working in unison and being firmly supported in extended position. The upper ends of the handle bars are connected by a hinged cross bar adapted



MAYER'S FOLDING BABY CARRIAGE.

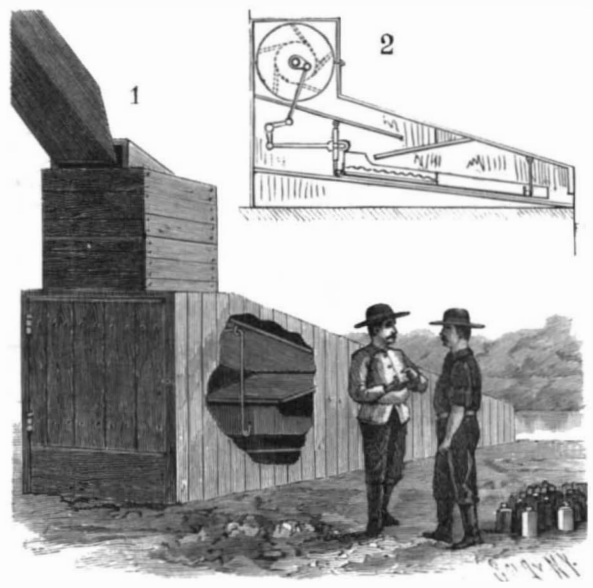


MAYER'S BABY CARRIAGE—IN FOLDED POSITION.

to swing down when the carriage is folded, this being the first operation in folding the carriage, after which the central pivotal axle blocks are moved longitudinally and the body folds together sidewise, when, the side fastenings being disconnected, the whole body may be swung on the side hinges to be folded transversely, in the smallest possible space.

A SIMPLE AND EFFICIENT AMALGAMATOR.

The illustration represents an apparatus of simple construction, more especially designed for placer mining and milling amalgamation of free milling ores, Fig. 1 showing the practical working of the amalgamator, with a part of the casing broken away, to disclose its interior, and Fig. 2 being a sectional view. In the upper end of the casing is a hopper in which turns a wheel whose buckets are supplied with water and gold-bearing sand by a suitable chute, the wheel being thus rotated, and delivering the water and sand in measured



DUNN'S AMALGAMATOR.

quantities upon an inclined chute, this chute discharging upon another oppositely inclined chute. The second chute discharges upon a riffle frame hung on pivoted links, the transverse parallel corrugations of the riffle being rounded so that the flow of water and sand will not be greatly retarded, the gold settling in the quicksilver contained in the depressions between adjacent riffles. A shaking motion is given to the riffle frame by a link which connects one of the hangers with one arm of an elbow lever whose other arm is connected by a link with a crank attached to the shaft of the water wheel. This improvement has been patented by Seth Dunn, of Custer City, Idaho. The casing of the amalgamator is designed to be entirely closed at its top and rear end, but the top and end have hinged covers to facilitate reaching the interior for removing the amalgamated gold and for cleaning or repairing the working parts.

Water Drinking in Typhoid Fever.

Water drinking in typhoid fever is not a new suggestion. The importance of subjecting the tissues to an internal bath was brought prominently to the notice of the profession by M. Debove, of Paris, who was perhaps the first to systematize this mode of treatment. The treatment of this eminent physician consists almost exclusively of water drinking. "I make my patients drink," he says; and they must be kept pretty busy in attending to this rinsing process; for they are required to take from five to six quarts of water daily, which would a mount to eight ounces every hour.

The writer has for many years followed the practice of having his patients drink from one-half to two-thirds of a glass of water hourly, when awake. It is sometimes, however, impossible to induce patients to drink a large quantity of water. In cases in which the stomach is dilated, the patient is often unable to absorb water so rapidly. In these cases the introduction of water by the rectum proves a satisfactory substitute for water drinking. Of course, if the patient subsists chiefly upon a diet of thin gruel, fruit juices, or skimmed milk, the amount of liquid thus taken may be subtracted from the quantity of water named. The important thing is to get into the system, and out of it, a sufficient amount of water to prevent the accumulation of ptomains and toxins within the body.

Copious water drinking does not weaken the heart, but, on the contrary, encourages its action, by maintaining the volume of blood. It also aids the action of the liver, the kidneys, and the skin; and by promoting evaporation from the skin, it lowers the temperature.—The Bacteriological Review.

KEEP A SCRAPBOOK.—The Keystone gives some practical directions. Every merchant should keep a scrapbook. This suggestion has been made before, but it is fully worth emphasizing. Every bright advertisement that you notice in your local paper or those of other towns; every model advertisement that you observe in your trade paper, and every practical trade-bringing plan or hint, should be cut out and pasted in the book, with full data as to the name and date of the paper. You will find such a book as this an inexhaustible treasury of riches, especially on those days when your ideas run scarce, and you are too busy to take time to evolve a good advertisement.

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A GREAT ICE SKATING RINK, WASHINGTON, D. C.

On January 6, an ice skating rink of great size and exceptionally complete in its equipment was opened at the national capital, the skating floor being 205 feet long by 115 feet wide, and it being stated that although there were over 9,000 people present, the freezing arrangements were so perfect that not even the shavings from the ice became soft. The rink is in a building of which the first floor is used as a market house, on the second floor of which is a great hall with high iron arched roof and a floor space of 358 by 156 feet, leaving ample room, besides the space taken up by the skating surface, for a promenade floor and reception rooms, cafe, music stand and orchestra chairs for 1,000 spectators. Our illustration, for which, with the accompanying particulars, we are indebted to Ice and Refrigeration, shows the arrangement of expansion piping before freezing the ice floor. The work of fitting up the hall as a skating rink was accomplished in the marvelously short time of twenty days. The floor being above the market, extra care had to be taken to insulate it properly and at the same time make it water tight, and the following was the method of laying or putting down this tank floor: First, there was put down a 2 inch thickness of asphaltum, then 1 inch boards, two thicknesses of paper, then a 1 inch air space was made, then 1 inch boards, two thicknesses of paper, then 2 inches of Georgia yellow pine plank, calked same as on board of a ship. Upon this floor were placed the expansion coils, being extra heavy 1¼ inch pipe, aggregating in all about 96,000 feet. Upon this floor 3½ inches of water were frozen to make the skating surface.

Directly opposite the hall is the power plant in a one story engine and boiler house 80 × 45 feet, in which are two 66 inch by 16 foot return tubular boilers, with pumps, filters, etc., and a deep well pump, as water is supplied by an artesian well. The compressor of the ice machine is double acting, being 15 × 30 inches, and is driven by a Corliss engine 20 × 42 inches, the fly wheel of which is a band wheel, which also drives a 600 light incandescent and a 50 light arc dynamo. The entire light for the hall is supplied by this machine, which presents the novel sight of one engine running simultaneously an ice machine and two dynamos. On the roof of this building has been erected the ammonia condenser. This building being about 85 feet from the hall, the distance the ammonia has to travel will be appreciated by the reader. Freezing is by direct expansion.

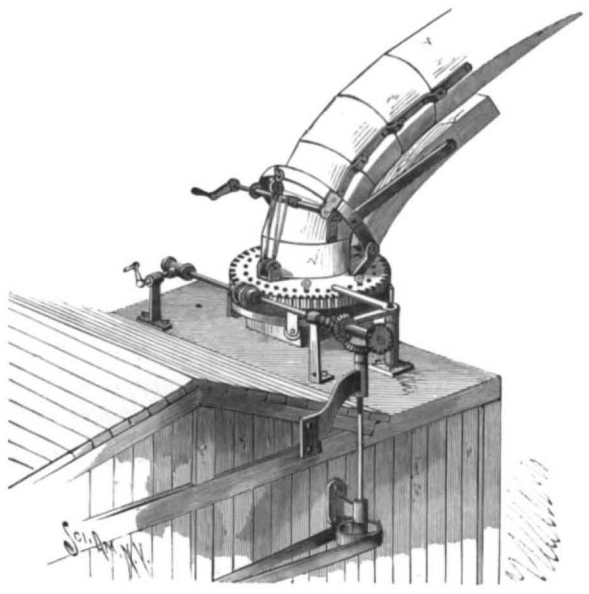
A Glass Plate of Different Colors.

This invention pertains to a new product and its manufacture. This product is formed by two or more layers of transparent or opaque glass cast upon each other so as to constitute a single plate upon which, by moulding or pressing, letters or designs of any shape or dimensions can be represented.

The method of manufacturing this new product is as follows: Upon a table provided with several rolls a certain quantity of glass is poured, which is leveled to the desired thickness either by moving the table or the lowest roll. Upon this plate, but before it has cooled off, another quantity of glass is poured, which, leveled with its respective roll, forms a second layer adhering perfectly to the first. If the two glass substances are of different colors, the plate obtained consists of glass of two colors, one upon the other. A plate of more colors can be produced in the same way. Then the plate is subjected to a moulding process in order to form the various designs or specially large letters. The impression can be accomplished either by the flattening roll or another one running behind it, or still better, by the vertical pressure of an engraved plate, or with cast designs and inscription.—Moniteur de la Ceramique et de la Verreries.

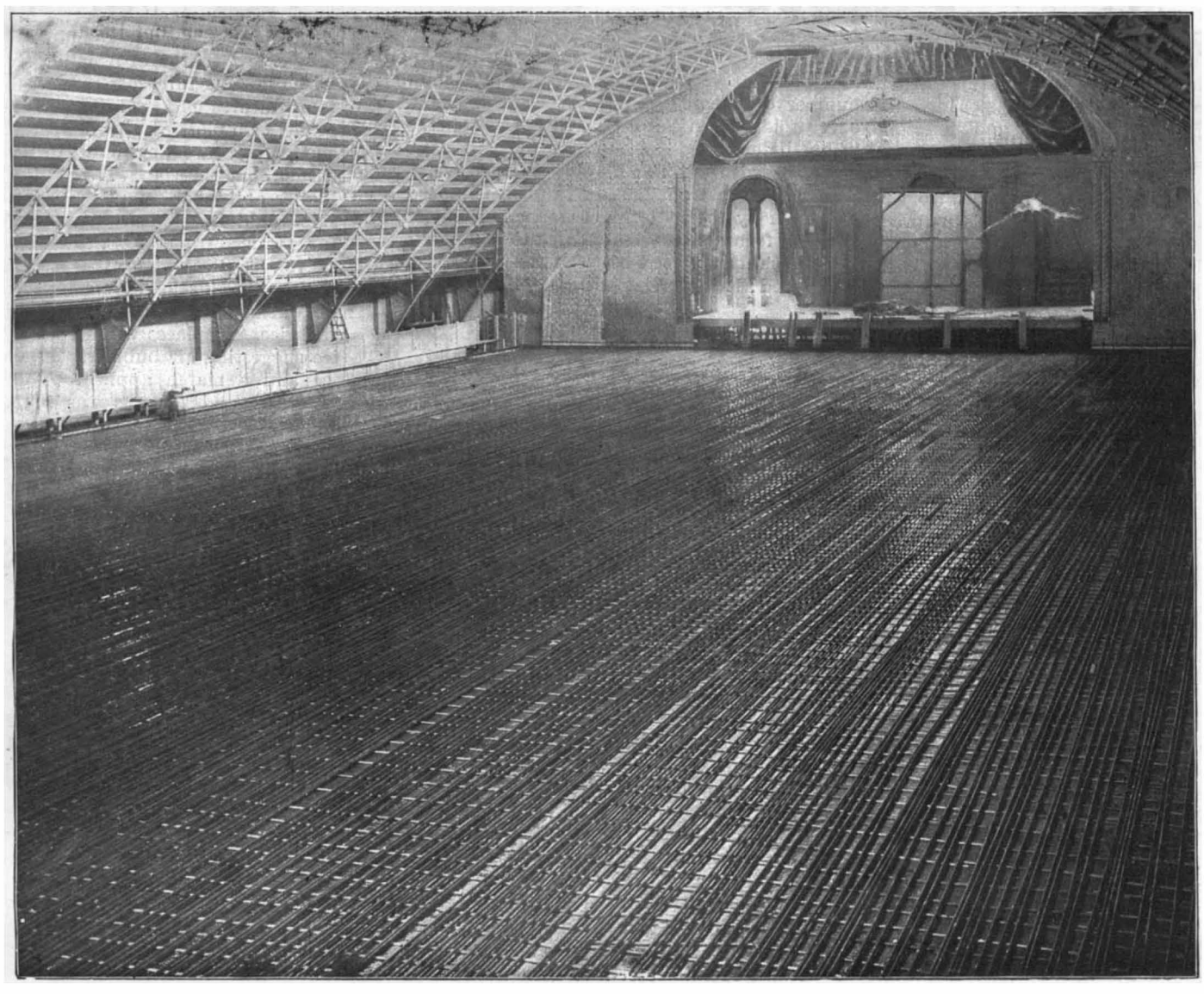
A PNEUMATIC STRAW STACKER.

The illustration represents a construction for stacking hay or straw by means of a pneumatic tube which may be attached to a thrashing machine, or placed in position to be easily regulated and used to advantage in barns and other buildings. The improvement has



KNAPP'S STRAW STACKER.

been patented by Peter Knapp, of St. Wendell, Ind., and is being introduced by John Ten Barge, of St. James, Ind. The tube is made in sections, connected and controlled by pivotally attached straps, the lower end of the tube being held to turn in a table on the rear of the thrashing machine or other support. Above the fixed table is a turntable secured to the lower joint of the tube and provided with peripheral teeth, downwardly extending bracket arms of the turntable having friction rollers engaging the underside of the fixed table. Projected from the bottom section of the tube are arms pivotally connected with a bow frame extending around the elbow section of the tube, and at the center of the frame is supported a pulley and a winding shaft having a crank arm, the long forward section of the pneumatic tube resting on a beam connected by side bars with the bow frame. A cable secured to the winding shaft is passed over a double pulley carried by the turntable and over the upper pulley, whereby, on operating the crank arm of the winding shaft, the tube may be raised or lowered to any desired extent. Journaled at one side of the thrasher or other support is a driving shaft having at its upper end a bevel gear, extending over which is a horizontal shaft on which is splined a sleeve fitted with two opposing beveled gears, either of which may be carried into mesh with the beveled gear of the drive shaft. The adjustable gears are brought into or carried out of action by a shifting lever of the elbow type, one of the members of which is connected with the sleeve, while the other extends over the top of the turntable, where it engages pins placed nearer or farther apart, according to the distance the tube is to travel to the right or left, the engagement of the shifting lever by a pin causing the lever to shift the sleeve, and thus reverse the direction of revolution of the horizontal shaft. The latter shaft carries a gear which meshes with the teeth of the turntable, and the inner end of the shaft is journaled in an adjustable box controlled by a screw shaft with a crank arm, whereby the driving gear may be carried entirely out of engagement with the turntable. It will thus be seen that the back and forth lateral movement of the pneumatic tube is automatically controlled, while vertical adjustment may be quickly and conveniently effected.



GREAT ICE SKATING RINK AT WASHINGTON, D. C.—EXPANSION PIPING LAID BEFORE FREEZING.

Condensed Food not a Success for Soldiers.

Some time ago the War Department conducted experiments with a view to reducing the weight and bulk of the soldier's rations without impairing their nutritive value. The report is in part as follows, as stated in the Medical and Surgical Reporter: "A company of the seventh infantry was detailed and furnished with condensed rations, consisting of coffee, soup, bread, and bacon. The coffee and soup were in small tablets, which, when placed in boiling water, were ready for consumption in two minutes. The bread was in small, flat cakes, the weight and hardness of a brick, but when moistened swelled out like a sponge. The bacon was compressed and needed only to be warmed in a frying pan. The soldiers started out with ten days' rations, but the campaign was brought to an abrupt end after four days of 15-mile marches. The food not only did not satisfy the hunger or give strength, but seemed to irritate the stomach." The Medical Record remarks: "Thus far the human laboratory, with its multiple, interdependent, and complementary methods, has a monopoly of its own in fixing the proper standards for digestion, assimilation, and subsequent growth. Each of the varied and subtile processes of digestion must necessarily adapt themselves to the construction and functions of an organ that has a purely vital as well as a merely chemical duty to perform."

Ocean Depth of 29,400 Feet.

The British surveying ship Penguin recently found an ocean depth of 4,900 fathoms, or 29,400 feet, in latitude 23° 40′ S., longitude 175° 10′ W., southeast of the Friendly Islands. The bottom was not reached, however, even at this depth, as a fault in the wire caused it to break before the greatest depth of the ocean at this point had been determined. It is said that the deepest cast hitherto obtained was one of 4,655 fathoms, or 27,930 feet, near Japan.

DURING 1894, 3,315 patents relating to electricity were granted in Great Britain, the United States, and Germany. Of these, 1,130 were British, being one-twentieth of all British patents, 1,704 were American, and 481 were German.

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Correspondence.

Mineral Wool.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of February 15 appears an article under the title "Danger in Mineral Wool," which is misleading. It is therein stated that "the threads, though very slender, being finer than cotton fibers, are of glass, and pieces of them may, unless the material is carefully handled, get under the nails, or into the skin, causing painful irritation."

The reader inexperienced in the use of mineral wool would naturally infer from this statement that the fibers are brittle and hard like glass. On the contrary, the fibers of mineral wool, when it is properly made, are soft and pliant, and can be handled without danger.

The writer has been, for many years, closely connected with the manufacture and use of this material, and has never known any one to be injured by handling it. Men, continually in the employ of this company for over ten years, have daily handled mineral wool, in the chambers where it is packed for shipment, and in applying it to its various uses, employing their bare hands to compact it in place, in the floors and walls of buildings, in refrigerators, and other places, without injury or discomfort. Neither the writer nor his associates have ever known any one to be injured by breathing dust from it. In fact, mineral wool can be handled with as much safety, and quite as little inconvenience to the handler, as brick, lumber, or other building material.

Cleveland, O. A. H. MASSEY.

Australian Platinum.

The assertion that New South Wales is exceptionally rich in the useful minerals has again become verified by the discovery of valuable platinum deposits at Fifield, in the western portion of the colony, of which the Parkes auriferous region forms part. Platinum has previously been recorded as occurring in the colony in the sea beaches between the Richmond and Clarence Rivers, on the northern coast; in ironstone and decomposed gneiss near Broken Hill, and grains of metal have not infrequently been met with by miners working various auriferous drifts in different parts of the colony. But until the opening up of the Fifield platina deposits, there had been no production upon a commercial scale. The field was first opened up in 1893, though the presence of platinum was recorded many years previously by a working miner, who received government aid to prospect the district. The formations represented are silurian slates intruded by diorite, and fossiliferous sandstones and limestone of devonian or silura-devonian age. The platiniferous lead is a little over a mile long; it varies in width from 60 feet to 150 feet, and is covered with from 60 feet to 70 feet of loam. The precious metals are practically confined to the bed rock and the drift for 3 inches above the bottom. Nuggets which weighed from a few grains up to 5 dwt. have been occasionally found. The crude metal contains about 75 per cent of platinum, and realizes at the present time upon the field 24s. per ounce. The quantity of platinum per load of wash dirt varies from 5 dwt. to 12 dwt., while the total value of the previous metals per load varies from 9s. to 37s. In the vicinity of Fifield, at an elevation of over 100 feet above the lead now being worked, beds of cement and indurated ferruginous shales occur, which are of tertiary age, or even older. These beds contain a little gold and platinum, but not where hitherto explored in payable quantities. Mr. Jaquet, geological surveyor in the New South Wales Mines Department, is of opinion that the precious metals in the recent deposits have been derived from these older conglomerates; that the latter have been disintegrated and ground sluiced by nature, and the deposits now being worked represent the resultant concentrates. Other beds containing platinum and gold probably occur under the flats in the vicinity of Fifield and Burra Burra. The prospecting of these flats, however, will be a tedious operation, since they are for the most part of great extent, and there is nothing upon the surface to indicate the path of gutters below. The development of the field has been much retarded by dry seasons and the consequent shortage of water for sluicing purposes. The Fifield platina lead has already yielded 1,200 ounces of platinum, and the gold obtained upon the whole field since 1893 totals about 1,800 ounces. At the present time 7,000 loads of wash dirt are dumped around the various claims awaiting treatment.—The Colliery Guardian.

A FRENCH statistician has given some interesting figures relative to theaters. Between 1751 and 1895 no fewer than 750 European playhouses were destroyed by fire. The average life of a theater is found to be 22½ years. In striking contrast to the comparative short life of a theater is that of the actor. In spite of late hours, hard work and a Bohemian atmosphere, the average duration of life in the theatrical profession is high.

A NOVEL HAND CAMERA.

The Paris Photo Gazette says: "M. Joux has just lately perfected a new form of hand camera which he has used for several months, and which gives excellent results. One of the principal improvements is what he terms the 'block system.' By this arrangement it is impossible to expose the same plate twice, since the shutter cannot be released until after the exposed plate has been changed.

"The mode of changing the plate is very simple, the construction of the magazine being such as to permit of its returning completely into the box after a plate is

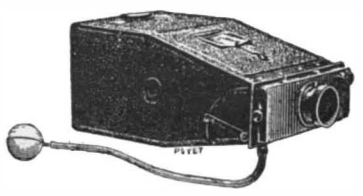

Fig. 1.

changed, and there is no lost space, the whole camera being very compactly built. As shown in Fig. 2, the changing of the plate is effected by pulling on the handle at the lower part of the side; in this way the size of the magazine (one of the sides of which is shown extended) is increased, and the extended magazine draws out with it at the same time the stack of plates, with the exception of the one situated at the top. This one, held back by two small hooks, remains in place and finally falls to the bottom when it is no longer sustained by the rest of the pile. When the magazine is pushed back, the pile of plates slide over the fallen plate at the bottom, at the same time bring-

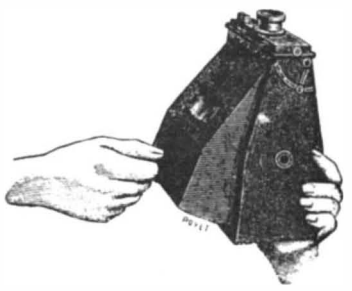

Fig. 2.

ing a fresh plate at the top into position for the next exposure.

"The magazine contains eighteen plates, and an indicator, moving automatically, always shows the number of exposed plates. A clear finder with a cover folds down into the thickness of the box, when the camera is put in its carrying case. The objective with an iris diaphragm is a very rapid Zeiss, F/8; the front part of the box is moved back and forth by means of an ornamented button, and allows a focus of from one meter to infinity.

"The shutter placed between the lenses is of variable speed; it is worked with the finger or with a

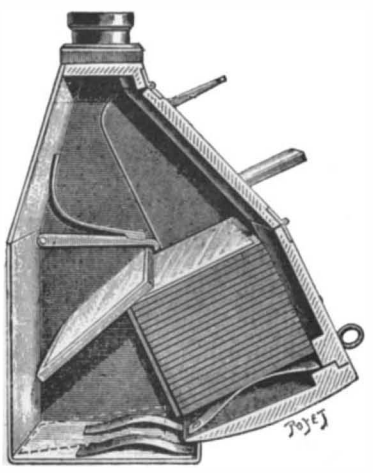

Fig. 3.—POSITION WHEN CHANGING PLATES.

bulb, and permits time or instantaneous exposures. The size of the plate is 6½ by 9 cm. The apparatus, loaded with eighteen plates, weighs 1,500 grammes, 4 lb.; its dimensions are 18 centimeters long, 8 thick and 11 wide."

Introduction of the Thermometer into France.

The history of the introduction of the first hermetically sealed thermometer into France is contained in Cosmos of recent date, with extracts from the correspondence of Pierre des Noyers, secretary of the Queen of Poland. In 1657 he sent a description of a Florentine thermometer to M. Boulliau, of Paris, with a drawing of it, which is reproduced in Cosmos, and in 1658 a specimen of the instrument was sent to Paris, and was apparently used by M. Boulliau on June 25 of that year. This thermometer was graduated by means of small black enameled knobs on the outside of the tube, and was subsequently improved by the Accademia del Cimento.—Nature.

Science Notes.

A large collection of 17,000 stuffed birds and many series of bird skeletons has been bequeathed to the British Museum by the late Mr. Henry Seebohm, the naturalist. It is the most valuable gift made to the natural history section of the museum in a quarter of a century. Its ornithological collection is now the largest in the world, consisting of 300,000 specimens.

A new apparatus for measuring the penetrative power of shot has recently been introduced in Germany by Herr Muller. The shot is fired into a large water trough through a thick gelatine plate, which closes at one end of the trough. The shot holes in the plate immediately close up after the shot has passed through, thus preventing the escape of the water. The bottom of the trough is divided by transverse ribs, which retain the shot where it falls. When the firing is completed, the water is run off and the position of the shots observed.

Experiments made with electricity on the toxins of disease by MM. D'Arsonval and Charrin show that the effect is to attenuate the toxin, converting it into a useful antidote. The toxin of the diphtheritic and the pyocyanic bacilli was subjected to the physical action of currents of high frequency. The current had no direct influence on the vitality of the microbes themselves, but modified the liquid in which they live so as to render it noxious to them. The action of the current, it is asserted, is not chemical, but purely physical. In twenty minutes a virulent poison can be turned into vaccinating matter. Electricity is to be tried on animals infected with the toxins to see whether the effect is the same on living tissue.

According to a paper on "The Temperature Variation of the Thermal Conductivities of Marble and Slate," contributed to the American Journal of Science by B. O. Pierce and R. W. Willson, such a temperature variation does not exist; in other words, marble and slate conduct heat equally well at all temperatures. The result is of some importance to the physics of the earth's crust, and the manner in which it was arrived at displays some ingenuity. Two faces of a slab of marble or slate were kept at different temperatures, and the fall of temperature between one surface and the other was determined by means of thermopiles. Now it is admittedly difficult to determine the temperature accurately at a certain point, and borings lead to error in estimated depth. So the expedient was adopted of slicing the slab into a series of layers pressed together, between every two of which a thermo-couple was introduced. The interstices were only a few tenths of a millimeter, and experiments with different intervals proved that the errors in the temperatures observed did not exceed 1° or 2° Centigrade. On plotting the temperatures and distances, the temperature was found to have fallen uniformly throughout the slab. If the conductivity had been higher at higher temperatures, the fall on the hot side would have been more decided. The temperatures ranged from 350° C. to zero.

Prof. Ira Remsen describes (in Science) a curious case of the accumulation of marsh gas under ice. A number of skaters were on a large artificial lake covered with ice. In places white spots were noticed in the ice suggesting air bubbles. A hole was bored in the ice and a match applied. The thin jet of flame burst up and the gas was found to be marsh gas formed by the decomposition of organic matter at the bottom of the lake. Prof. Remsen suggests that skating ponds illuminated by natural gas are among the possibilities of the future.

Experiments on the spreading of disease by burial made by Dr. Loseuer tend to prove that there is little danger of infection from the practice. Carcasses of animals infected with different diseases were buried as nearly as possible as human bodies would have been. Bacilli of cholera could no longer be found in the remains after 28 days, those of typhoid fever disappeared after 96 days, those of tuberculosis after 123 days, those of tetanus were very virulent after 234 days, but disappeared after 361 days, while the anthrax bacilli continued in full force to the end of the year of investigation. In none of these diseases save that of anthrax did the germs find their way to the surrounding soil and water.

M. E. Chaix, says the Revue Scientifique, wishing to find out whether in calm weather the air of the seashore contains an appreciable quantity of sea salt, made several experiments in Jersey, in August, 1895. In each experiment he caused, by means of an aspirator, a thousand liters (30 cubic feet) of air to pass through a solution of silver nitrate. In every case there was not the least cloudiness of the solution, proving that the air contained no salt. This is not at all surprising, for it is well known that the air contains salt only when the wind carries off salt spray held mechanically in suspension, and derived from the wave crests; the salt of sea water cannot evaporate into the atmosphere. The evident conclusion is that, to obtain the beneficial action of sea air, we must go where the air is sufficiently agitated by the wind to continually hold sea water in suspension. Such localities are infinitely more beneficial and active.

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Effect of Temperature upon Strength of Wrought Iron and Steel.

At a recent meeting of the American Society of Mechanical Engineers, Mr. R. C. Carpenter described a series of tests conducted in the testing laboratory of Sibley College, with a view to determine the effect of temperature upon the strength of wrought iron and steel. The tests were made upon a 100 ton Emery testing machine which was built by William Sellers & Company for the Columbian Exposition.

To enable the test piece to be maintained at the desired temperature for a considerable length of time, it was inclosed in a solid block of cast iron, made in two halves, longitudinally, and clamped upon the specimen. A mercurial thermometer, the upper part of which was filled with nitrogen to prevent vaporization of the mercury at high temperatures, was placed in direct contact with the test specimen within the cast iron box, which was heated from below by four Bunsen burners. This method of heating proved satisfactory, and gave very uniform results. The best specimens were turned down to a diameter of one-half inch for a length of 8·8 inches. Thirty specimens of wrought iron and twenty-five of steel were tested, the temperatures varying from 22 degrees to 825 degrees Fahrenheit.

Results.—The general results of the test show that all the curves have a point of contraflexure at about 70 degrees Fah. and another at a temperature not far from 500 degrees. The maximum strength is found at temperatures of 400 to 550 degrees Fah. At temperatures higher than this, all the materials show a rapidly decreasing strength. The variation in strength with change of temperature is marked; thus, for instance, with wrought iron, if we represent the strength at temperature of 75 degrees Fah. as 100, that at from 22 degrees to 25 degrees is 103 to 104, at 500 degrees Fah. is 126, while at 825 it would be represented by 80·7, which is 63 per cent of the maximum strength; beyond this point the strength steadily decreases.

The curve for tool steel has the same general form, the temperature of maximum strength being, however, about 400 degrees. That for machinery steel is similar, but no experiments were made at low temperatures and no critical point was observed.

The elongation in 8 inches of length for the tool steel and wrought iron is shown in curves of the same general form, which agree in showing smallest elongation when at a temperature about equal to the boiling point of water.

TESTS OF WROUGHT IRON SPECIMENS.

Temperature in degrees Fahrenheit.	Tensile strength in pounds per square inch.
23	50,500
82	48,820
250	54,010
320	57,240
475	62,610
625	54,450
825	39,330

TESTS OF MACHINERY STEEL SPECIMENS.

Temperature in degrees Fahrenheit.	Tensile strength in pounds per square inch.
73	63,650
300	68,680
525	116,370
575	105,660
680	58,120
800	55,460

TEST OF TOOL STEEL SPECIMENS.

Temperature in degrees Fahrenheit.	Tensile strength in pounds per square inch.
28	107,990
75	140,080
160	109,650
230	132,310
425	145,200
600	120,170
825	103,740

The author of the paper states that he is largely indebted for the above data to a thesis investigation of O. R. Wilson and R. L. Gordon, of Sibley College.

The New York Botanical Garden.

With the opening of spring, work will be prosecuted on the New York Botanical Garden, whose managers propose to make it one of the finest places of the kind in the world. The plans of the garden have been formulated by Cornelius Vanderbilt, president of the garden, President Seth Low, of Columbia College, William E. Dodge, Judge Addison Brown and Prof. N. L. Britton, and preparations to carry them into effect have been completed. It is expected that by the end of warm weather great advances will have been made toward beautifying the region set apart for the garden.

The garden will comprise 250 acres appropriated from Bronx Park, near the Bedford Park station of the Harlem Railroad. The land abounds in natural beauties, which will, of course, be preserved.

A building with three stories and a basement, and having a total floor space of 90,000 square feet, is to be erected near the entrance to the garden for use as a museum. It will also contain rooms for a library, an economic museum, herbaria, laboratories and also apartments where students may study special subjects.

An immense horticultural house of iron and glass, covering an acre of ground, will be another feature of the garden. A central dome 60 feet high will cover the palm house, and smaller buildings of similar construction will be erected for nurseries and rain shelters.

The trustees of Columbia University have agreed to deposit its herbarium and botanical library in the museum building and the mycological herbarium of J. B. Ellis, of Newfield, N. J., will also be preserved there. Lectures will be delivered in the museum, and the work of the garden will be published from time to time in pamphlets.

Three miles of stone driveways will be constructed within the garden, and two driveway bridges, besides many foot bridges, will span the Bronx. Footpaths will afford access to every part of the garden.

A temporary nursery has been established in the garden, and about 2,500 trees and shrubs are ready for transplanting. The native flora in the garden will be preserved. The trees will be carefully labeled. Aquatic and bog plants will be cultivated in the Bronx River and on the marsh land in the garden.

The engineers have surveyed the garden and made topographical maps on a scale of 50 feet to the inch, showing every detail of the garden. These will be shown on the evening of March 26, at the reception of the New York Academy of Sciences, in the American Museum of Natural History. It is expected that several years' time will be required before all the plans for the garden can be realized.—New York Times.

Trade Marks and Trade Names.

The American Druggist and Pharmaceutical Record clearly defines the nature and extent to which protection is afforded for trade marks and names. A trade mark is a symbol arbitrarily selected by a manufacturer or dealer and attached to his wares to indicate that they are his wares. In selecting such a device he must avoid words merely descriptive of the article or its qualities, or such as have become so by use in connection with known articles of commerce. He must also avoid words—e. g., geographical names—which are descriptive of the local origin of the goods, if other persons have the right to deal in goods of similar origin. When it has become generally known in the trade that this word or symbol has been taken by one dealer or manufacturer to indicate his goods, he acquires a title to it for that purpose, and no one else can use it even innocently.

A trade name is of a different character. It is descriptive of the manufacturer or dealer himself as much as his own name is, and frequently, like the names of business corporations, includes the name of the place where the business is located. If attached to goods, it is designed to say plainly what a trade mark only indicates by association and use. The employment of such a name is subject to the same rules which apply to the use of one's own name of birth or baptism. Two persons may bear the same name and each may use it in his business, but not so as to deceive the public and induce customers to mistake one for the other. The use of one's own name is unlawful if exercised fraudulently to attract custom from another bearer of it.

Trade marks, properly so called, may be violated by accident or ignorance. The law protects them, nevertheless, as property. Names which are not trade marks, strictly speaking, may be protected likewise if they are taken with fraudulent intention, and if they are so used as to be likely to effect this intention.

It has been very correctly said that the principle of the decided cases is this: That no man has a right to sell his own goods as the goods of another. The principle may be expressed in different form by saying: No man has a right to dress himself in colors, or adopt and bear symbols, to which he has no peculiar or exclusive right, and thus personate another, for the purpose of inducing the public to suppose either that he is that other person or that he is connected with and selling the manufacture of such other person, while he is really selling his own. It is perfectly manifest that to do these things is to commit a fraud, and a very gross fraud.

The right which any person may have to the protection of a court of equity does not depend upon any exclusive right which he may be supposed to have to a particular name or to a particular form of words.

His right is to be protected against fraud, and fraud may be practiced against him by means of a name, though the person practicing it may have a perfect right to use that name, provided he does not accompany its use with such other circumstances as to effect a fraud upon others.

The offense is not merely in duplicating, for similarity, not identity, is the usual course when one seeks to benefit himself by the good name of another; but in many cases the effect of imitation depends upon the propinquity, especially where the name is one applied to a business or a store, and the similar use would not lead to deception. But it is different where the field of action is a locality, or the commercial world, as in the use of a trade mark. Though sometimes a name assumed at the formation of a business on a small scale may become important, where the success of the article or the enterprise of the proprietors extends the original limits, and the right to protection will grow with the growth of its reputation and the territory covered by its sale.

The End of an Electric Patent War.

The long fight between the General Electric Company and the Westinghouse Electric and Manufacturing Company has at last been ended. For nearly a year those largely interested in the two companies have been endeavoring to come to some arrangement which would reduce the competition between the two concerns, which are the largest manufacturers of electrical appliances in the country. The rivalry between the companies has been great, and has resulted in many expensive lawsuits. It is said that the patent litigation between the two companies has cost several millions in legal expenses and for the services of experts. The result of this litigation has been to increase competition, lower prices and benefit many smaller concerns. The following statement has been given out by the General Electric Company:

"Negotiations between the General Electric Company and the Westinghouse Electric and Manufacturing Company have resulted in an arrangement with respect to a joint use of the patents of the two companies, subject to existing licenses, on terms which are considered mutually advantageous.

"It has been agreed that after certain exclusions the General Electric Company has contributed 62½ per cent and the Westinghouse Electric and Manufacturing Company 37½ per cent in value of the combined patents, and each company is licensed to use the patents of the other company, except as to the matters excluded, each paying a royalty for any use of the combined patents in excess of the value of its contribution to the patents.

"The patents are to be managed by a board of control consisting of five members, two appointed by each company and a fifth selected by the four so appointed. Both companies have acquired during their existence a large number of valuable patents, and numerous suits have been instituted in consequence of the infringement of these patents by one party or the other, or by their customers. In the prosecution of these suits large sums of money have been expended and the general expenses of the companies have in this manner been greatly increased. It is expected that the economies to be effected will be very considerable, and that the two companies and their customers will be mutually protected.

"The especial incentives which led to the arrangement at this time were the recent decisions in favor of patents of the General Electric Company controlling the overhead system of electric railways, the approaching trials on a number of other important General Electric patents on controllers and details of electric railway apparatus and systems and other electrical devices, and the equally strong position of the Westinghouse Company in respect to power transmission, covered by the patents of Nikola Tesla, and in view of its other patents in active litigation, some of which are of controlling importance."

The Sandstorm in New Jersey.

The face of the great sand plains of south Jersey have been considerably changed by the recent high winds, which caught up the sand and piled it against houses, fences or any other obstruction. Cuttings and ditches have been filled in, great piles of sand were caught by bushes and heaped up in some places until the sand mound was over twenty feet high, and some of the roads are almost impassable, owing to the amount of sand which was blown on them. The Pennsylvania Railroad had men at work day and night during the storm to keep their tracks from being buried in sand. The sand sifted into houses and barns, covering everything with a gritty deposit. Travel in this part of the country during the high winds was almost impossible, for the sand was blinding and worked into clothing so as to irritate the skin, while hundreds of people are suffering from sore eyes as the result of their exposure to the great sandstorm.

To Bore Glass.

Strong glass plates are bored through by means of rotating brass tubes of the necessary diameter, which are filled with water during boring. To the water there is added finely pulverized emery. The boring cylinder is put into motion by means of a drill or bow drill. Weaker glass can be provided with holes in an easier manner by pressing a disk of wet clay upon the glass and making a hole through the clay of the width desired, so that the glass is laid bare here. Then molten lead is poured into the hole and lead and glass drop down at once. This method is based upon the quick, local heating of the glass, whereby it obtains a circular crack, the outline of which corresponds to the outline of the hole made in the clay. The cutting of glass tubes, cylinders, etc., in the factories is based upon the same principle, says a Pittsburg paper called China, Glass and Lamps.

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ROENTGEN PHOTOGRAPHY.

The fish shown in the cut is a most beautiful example of Roentgen photographv. It was taken by Prof. Vicentini, of Padua, Italy, and has been aptly commented on as looking like a fossil fish. It is worthy of comparison with the best that has yet been done.

We have received two exquisite examples from the Case School of Applied Science, Cleveland, O.. due to Prof. Dayton C. Miller. One represents a hand and half of the forearm, with wonderful distictness, every bone being clearly and sharply brought out. We regret that want of space prevents our reproducing it. Another shows an aluminum medal. Twenty minutes and five minutes exposure respectively were required for them, with a spherical Crookes tube, and six inch induction coil, with three amperes at twenty volts in the primary. The arm was held in place by bandages, the plateholder was closed with pasteboard slides, and the tubes were twelve inches from the wrist. A number of other important results have been obtained by Prof. Miller at the Case School, largely in the direction of physiology.

Flames have been tested in the X rays and have proved almost transparent. Flame, it is interesting to remember, is also almost transparent for light waves. In the article on this subject, on page 103 of the present volume of the SCIENTIFIC AMERICAN, the use of a fluorescent compound for the emulsion was suggested. Dr. Pupin, in this city, and others have done work upon this line. A phosphorescent plate was tried in the plate holder, phosphorescent zinc sulphide was applied to the plate, and other variations on the same theme were tried with results at least of interest. In the light of these experiments, it is of interest to note that Capt. Abney, the eminent English authority, has gone so far as to hold that the X ray effect is due possibly to phosphorescence or else to some unknown action produced by the X rays upon the glass within the plate holder.

The rays have been found by Prof. J. J. Thomson, of Cambridge University, England, to operate powerfully to discharge electrified bodies, and the electrified plate has proved a far more delicate test for the presence of X rays than is the phosphorescent one. The rays seem to convert non-conductors into conductors, as no dielectric can prevent the discharge; no direct discharging power can be attributed to the rays in Prof. Thomson's opinion.

Prof. Dewar has produced results going to show that transparency to the rays varies in an inverse ratio with the atomic weight, instead of with the specific gravity. Their use has been suggested for distinguishing true from false precious stones. It is reported that diamonds are relatively transparent and that true pearls are opaque. The diamond test as detailed bears out Prof. Dewar's theory.

Elihu Thomson has tried some interesting experiments in getting manifold photographs by superimposing a number of layers of sensitized photographic papers, with the result that a photographic plate could receive an impression through a number of sheets of bromide paper, each of which also would develop a feeble photograph. He also strongly recommends intensification.

Nikola Tesla has worked upon the subject with fine results, getting photographs of the shoulder, foot and head with exposures ranging from 15 minutes to an hour. He also has worked at most remarkable distances, one very clear example being produced at a distance of eleven feet from the source of the rays and through a wooden cover with half an hour of exposure. He has found that a feeling of sleepiness is produced when the head is exposed to the rays in being photographed.

In the article in the SCIENTIFIC AMERICAN already alluded to, the gravitational aspect of the rays is spoken of. This aspect has been somewhat fully considered in an elaborate paper by Prof. Oliver Lodge, of England, with naturally somewhat negative results.

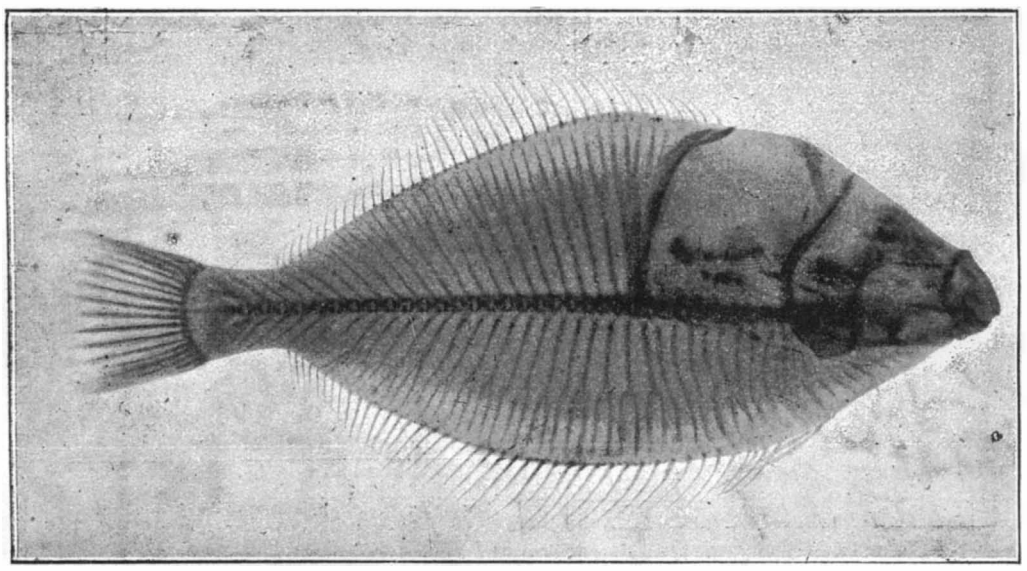
It is impossible to resist the conclusion that our views of the great mystery of gravitation may yet be somewhat clarified by our study of the new non-refrangible, unreflectable X rays.

Commerce Across Behring Straits.

Dr. Benjamin Sharp, at a recent meeting of the Academy of Natural Sciences, Philadelphia, gave some suggestive information about possible ancient commerce across Behring Straits. The distance is about forty miles and in the middle are the Diomede Islands, say twenty miles from each shore.

On the American side there is abundance of wood from which canoes, etc., might be made, but there is none on the Siberian side. The skin boats used by the Siberian natives, made from walrus hide, could not have been sewed sufficiently tight by bone needles to have served to cross the strait. The distance is bridged by ice about once in five years, but the passage across is considered quite dangerous, and nothing but the love of tobacco will induce a native to venture. The inhabitants of the Asian side appear to have been more influenced by the Eskimo arts than the reverse.

These facts and the general bearing of Dr. Sharp's observations are unfavorable to an extended early communication from the Siberian coast to the American.—Science.



X RAY PHOTOGRAPH OF A FISH, BY PROF. VICENTINI.

DR. PUPIN'S X RAY PHOTOGRAPH OF A WOUNDED HAND.

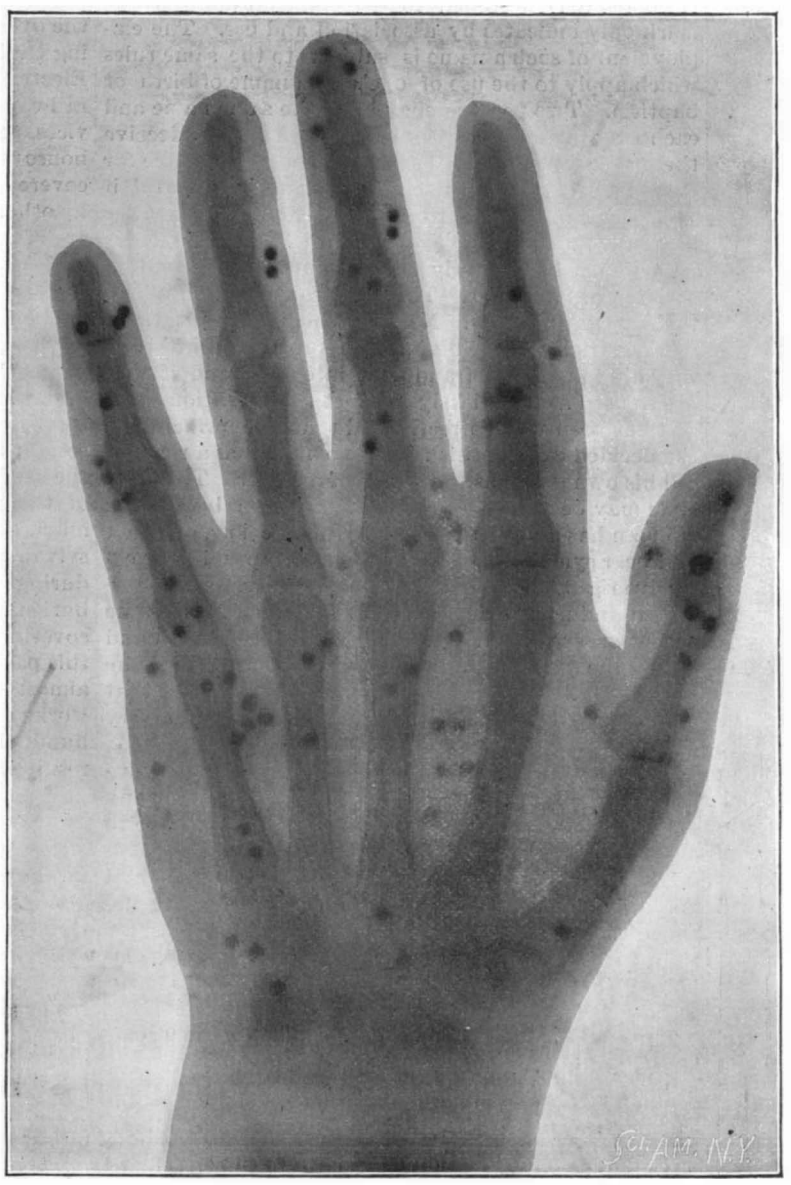
The X ray view of the wounded hand which we give our readers is one of the most recent achievements in X ray photography, and is interesting not only from the unique subject, but from the fact that it has been executed in this city as a guide to surgical treatment. The victim is a person well known in New York, and is a member of one of the leading law firms of the city. He was injured by the accidental discharge of a small gun while shooting over a friend's preserve in England. In the grass or bushes he saw a small cannon. When stooping down to examine it the weapon was discharged, probably by his foot catching or touching an invisible wire attached to its lock and lying in the grass. He was in the act of reaching forward with his hand when the explosion took place, and the entire charge entered his hand when only some two feet from the muzzle. The cannon had been placed there by gamekeepers with a view to arresting poaching, and it had been their design to load it with a blank cartridge, but by accident a loaded cartridge was inserted.

The sufferer, after having his hand treated, returned to America, and being a personal friend of Dr. Pupin, of Columbia College, the latter took special interest in producing an X ray photograph of the hand. Not only was the subject one of the most interesting that had ever presented itself to Dr. Pupin, but it appeared possible that the photograph might be a valuable guide for surgical operations.

This extraordinary and successful photograph shows with great distinctness some seventy-two shot embedded in the hand, which shot are, of course, more easily counted in the large photograph than in the diminished reproduction given here. Several of the pellets have already been extracted, but it is believed that with the aid of this photograph the operation of relief may be carried on with great certainty and precision.

The Crookes tube used in producing the photograph was a spherical one; the time of exposure was twenty minutes; a powerful induction coil operated by the incandescent lighting circuit, with a rotary circuit breaker, was employed to excite the tube. The circuit breaker was actuated by an electric motor.

It is not going too far to assert that Dr. Pupin has produced in this example one of the most interesting examples of X ray photography that has yet been produced. Its value from the surgical point of view is obvious. Other examples of his work were of almost equal interest; one especially of a hand showing a long standing dislocation of the thumb joint should be cited.



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DR. PUPIN'S X RAY PHOTOGRAPH OF A HAND CONTAINING SEVENTY-TWO SHOT.

Another Dark Star.

The star catalogued as 70 Ophiuchi, by Flamsteed 117 years ago, was discovered by William Herschel to be an unequal double. Its period as then apparent was 93 years. The star is now known to be behind time. Left to itself it would have completed its circuit in 88 years. There exists in the system some unknown disturbing force. After many unsuccessful attempts to account for the erratic motion of the star, Dr. See offered an explanation. The star had hitherto been treated as a binary, whereas it should have been treated as a ternary. An obscure disturbing body must be present in the system. This amounted to a discovery. There is now no doubt that 70 Ophiuchi is a triple star composed of two suns linked with a dark body; the latter with the shining satellite describes a very eccentric orbit around the chief star in 88 years, while it revolves around its companion in 36 years; hence the mass and dimensions of the system are at once known. The three bodies taken together possess 2·8 times the gravitative force of the sun, and the mean radius of the subordinate pair is 28 times the distance of the earth from the sun, that of the orbit Neptune being 30 times the same unit.

Miss A. M. Clerke, from whose article in Knowledge we condense the above, says that "the conditions in this system are such that an actual collision would be no improbable event."

TUBES differing from the ordinary Crookes tubes are now for sale in London. They are called "X ray focus tubes," and are intended for taking the Roentgen photographs.

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PREPARATION OF LAMB AND KID SKINS FOR GLOVES.

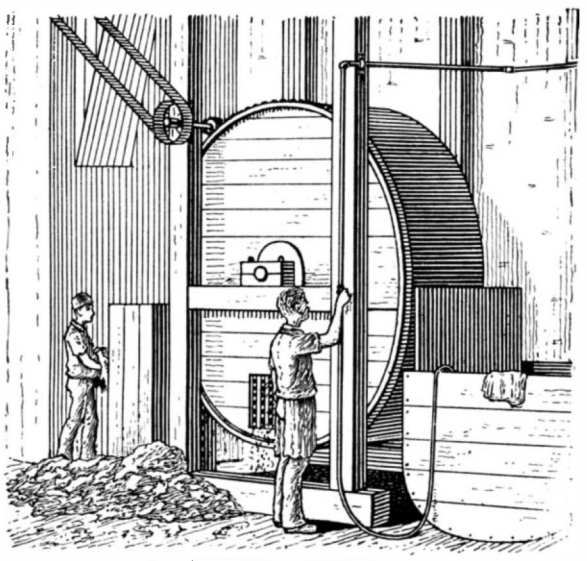
Kid gloves are made principally from lamb and kid skins imported from Brazil, France, and Germany. They come to this country packed in bales containing from 250 to 400 skins. In preparing the material for gloves, the skins have to pass through a number of processes such as washing, hairing, paddling, tanning, staking, coloring, and polishing. The skins, which are about 4 feet in length and about 3 feet in width, are first placed in wooden tubs and thoroughly soaked in cold water. From 600 to 800 skins are placed in each tub and left to soften for from one to two days, according to the season. From the soaking tubs they are placed in a circular revolving drum and washed. This drum is about 8 feet in diameter and about 4 feet in width and revolves at the rate of about 60 revolutions per minute. A number of wooden pins connected on the interior of the apparatus shift the skins about as it revolves, so that the stream of water which passes in at the center of the drum thoroughly saturates and frees them from dirt. After washing for a quarter of an hour, they are taken out and placed in lime pits. These pits are about 8 feet in depth, 8 feet in length, and about 5 feet in width. From 800 to 1,000 skins are placed in each of these pits and are covered with lime and water for about two weeks. The lime acts on the pores of the skin, opening them so that the hair can be easily removed. The skins are taken from the pits by means of long handled tongs. To take off the excess of lime, the skins are paddled. This is performed by placing the skins in cold water and running them back and forth over a paddle wheel. This wheel is about 3 feet in diameter, about 6 feet in length, and travels at the rate of about 40 revolutions per minute. After paddling, the hair is removed by spreading the skins out over an oval-shaped wooden beam, an operator then scraping off the hair by means of an instrument similar in shape to a carpenter's draw knife. A good workman can scrape off about 20 skins per hour. The next operation is fleshing. A skin is placed as before over a beam, the operator cutting off the particles of flesh adhering to the skin, giving it an even thickness and also trimming off the ragged ends. The scraps are sold to glue makers, and the hair to plaster and carpet manufacturers. About 20 skins can be fleshed per hour. After fleshing the skins are washed again in the revolving drum for half an hour, after which they are fleshed again to take off the grease. The material is then paddled again in warm water, after which the skins are spread out again on beams and slated, the process taking off the surplus dirt and giving them a finish. They are then paddled and then drenched in a tub of bran and water. About 800 skins are placed in the drench tub at a time, and paddled for 12 hours, the operation removing the lime and opening the pores of the skins. The skins are then put into a revolving drum containing a tanning liquor composed of alum, salt, flour, and the yolks of eggs. After revolving in this drum for twelve hours at the rate of 80 revolutions per minute, the skins are taken out and hung up on hooks in a drying room in a temperature of 110° for twenty-four hours.

When the skins are dry, they are dampened with water and put into a mill and softened. This mill consists of two perpendicular swinging planks suspended from the ceiling, connected to the bottom ends of which are large wooden blocks, which move back and forth when the apparatus is in motion. The dried skins to the number of 50 or more are placed on the floor of the mill in front of the blocks, which, as they move forward, squeeze and press them together until they become soft, after which they are staked. This is performed by drawing the skins back and forth over the edge of a broad steel knife, about 18 inches in length and about 8 inches in width. After this operation, which also softens the material, they are put again into the drying room, after which they are staked again, the operation taking off the dried flour, which sticks to the material from the tanning liquid.

The white skins are then packed away for a few months to ripen for working purposes. The skins are then selected out for coloring, being first washed in a drum of cold water for 20 minutes, after which they are placed in a revolving bath of egg yolk for twenty-four hours, which softens and makes the stock pliable. The skins are then colored. A skin is first slicked out smooth on a lead covered table and given a wash of potassium bichromate and soda; the solution preparing the skin so that it will take the coloring ingredients. The gloves are colored in black, drab, and tan, iron sulphate being used to produce black, zinc sulphate for drab, and sulphate of alum for tan color.

The coloring ingredients are poured on the skins with a cup and rubbed in with a brush. The skins are then dried and steaked again, and then polished over a flannel covered wheel. The raw skins cost from $7 to $9 per dozen.

The sketches were taken from the plant of C. G. Gottschalk, Jersey City Heights, N. J.

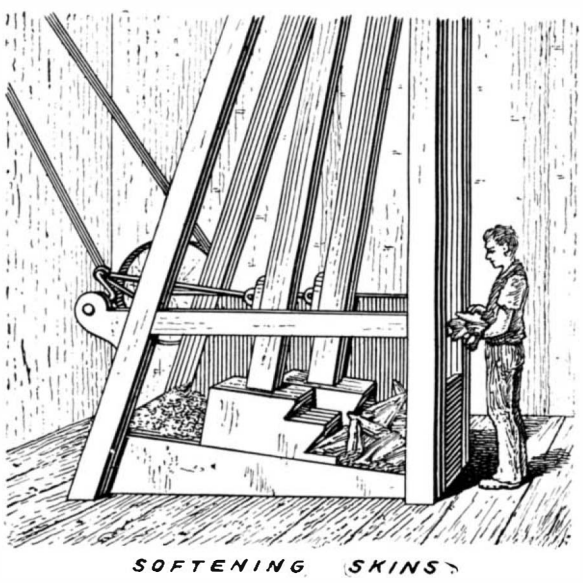


WASHING DRUM

PADDLING SKINS

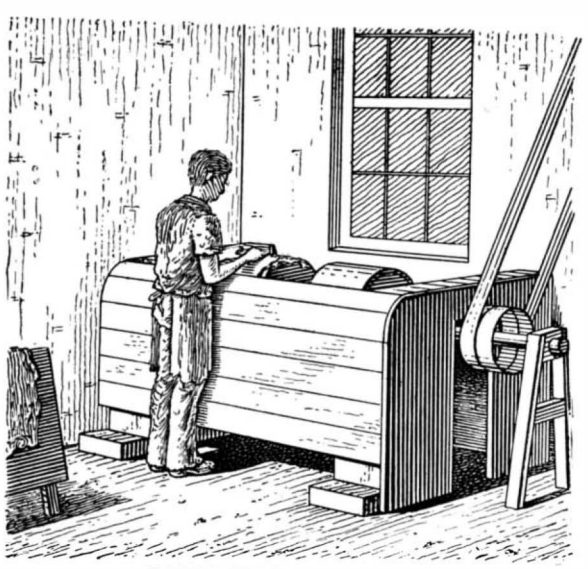
UNHAIRING BEAM.

STAKING.



SOFTENING SKINS.

COLORING.



POLISHING SKINS.

Fattening Oysters.

Off the shores of eastern Virginia a new method is now being tried of fattening oysters. Hitherto the plan adopted by the oyster men has been to transfer the oysters from the bays along the Atlantic coast to the estuaries of the rivers, to feed on the matter brought down by the current. In the low, marshy ground that fringes one of the bays on the Virginia coast, a number of parallel canals are being made into which the sea water will be admitted by sluice gates. In these canals the oysters will be grown, much as water cresses are grown around London. The oysters will find their natural food, which consists of diatoms and other minute algæ, which are reproduced in prodigious quantities when salt water is mixed with a small percentage of fresh water. On a small scale the plan has worked successfully. Thus far the small oysters have been transplanted into the canals from the bays; but, with the plan in full operation, this will not be necessary, as the canals open on to the breeding grounds, and during the early summer, when the spawn is given off, it will float into the canals, and the oyster beds will be planted naturally. Other advantages claimed for the new method of culture are freedom from sewage contamination, the easy exclusion of the enemies of the oyster, and the ease of harvesting.

The Oldest Botanical Work.

The oldest botanical work in the world, says the Newcastle Chronicle, is sculptured on the walls of a room in the great temple of Karnak, at Thebes, in Egypt. It represents foreign plants brought home by an Egyptian sovereign, Thothmes III, on his return from a campaign in Arabia. The sculptures show not only the plant or tree, but the leaves, fruit and seed pods, separately, after the fashion of modern botanical treatises.

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Highest Speeds of Railroad Trains for Various Distances.

Date.	Railroads.	Route.	Distance.	Time.	Speed, including stops.	Weight.
			Miles.	H. M. S.		Tons.
June, 1876	Pa.; P., F. W. & C.; C. & NW.; U. P.; C. P.	Jersey City to Oakland, Cal.	3,311	83 45 0	39·53	..
May, 1893	N. Y. C. & H. R.; L. S. & M. S.	New York to Chicago	964	19 57 0	48·20	..
October 21, 1895	L. S. & M. S; N. Y. C. & H. R.	Chicago to New York	952	17 45 0	54 20	..
August, 1895	L. & NW.; Caledonian	London to Aberdeen	539	8 32 0	63·24	75
October 24, 1895	L. S. & M. S	Chicago to Buffalo	510	8 1 7	63·61	152
September 25, 1895	N. Y. C. & H. R.	Albany to Syracuse	147	2 10 0	68·23	83
October 24, 1895	L. S. & M. S	Erie to Buffalo Creek	86	1 10 46	72·91	152
" "	" "	Between Erie and Buffalo Creek	75	1 0 0	75·00	152
" "	" "	" " "	59	..	76 08	152
April 21, 1895	Camden & Atlantic	Camden to Atlantic City	58	45 45	76 46	32
" "	" "	Liberty Park to Absecon	49	37 30	79·70	32
" "	" "	Berlin to Absecon	35	25 45	82·90	32
" "	" "	Winslow Junction to Absecon	24	16 00	88·00	32
October 24, 1895	L. S. & M. S.	Between Erie and Buffalo Creek	8		85·44	152
May 19, 1893	N. Y. C. H. R.	Looneyville	5	3 00	100 00	113
May 11, 1893	" "	Grimesville	1	0 32	112·50	113

—Safety Valve.

The Banana.

Never in the history of the world's trade has there been so marked an example of an edible article of commerce attaining within a comparatively short period the popularity achieved by the banana. It is not long ago that this luscious product of the tropics was only heard of as a vegetable curiosity. Occasional parcels were brought to England by vessels trading from the West Indies or the West African islands; but these reached no farther than the narrow circles of the friends to whom they were sent. The omnivorous British public remained practically ignorant of the rich, wholesome fruit which nature was ready to produce so bountifully. Now, however, no fruiterer's stock is complete without its bunches of richly tinted bananas; while the enterprise of the "coster" and other itinerant venders has placed the fruit within the reach of the poorest.

Originally the banana was a native of the eastern tropics, but now it is cultivated in all tropical and subtropical countries, whether in the Old or New World.

The plant itself is a peculiar one, the stem, which attains a height of fifteen or twenty feet, being practically formed by the sheathings of the leaves, the blades of which reach the very respectable dimensions of eight or ten feet in length and eighteen inches or two feet across. The fruit clusters, which branch from the stem, have been known to weigh upward of ninety and even a hundred pounds. A bunch of average bananas contains eight hands of ten bananas, while those of inferior quality will consist of but six or seven hands.

The productiveness of the banana plant is enormous. We are sometimes wont to refer to the productive power of grain or the potato as examples of extraordinary fertility. But, according to Humboldt, the banana is more than a hundred times as productive as wheat and forty-four times as productive as the prolific potato.

As a complete article of food, containing in itself the principal elements necessary to preserve the human machine in health and strength, this fruit is one of the completest with which nature has furnished us. The principal constituent is of course water, which practically forms three-fourths of the weight of the banana. Sugar, pectine, etc., compose about twenty per cent., while nitrogenous matter is, roughly speaking, accountable for the remaining five per cent.

In many tropical areas the banana is the staple food, and from the unripe, sun-dried fruit a most nutritious flour is manufactured. In fact, this fruit is to a great section of the inhabitants of the tropics, and the regions adjoining, what wheat is to the European and rice to the Hindoo.

Twenty-five years ago, some men interested in the New York fruit trade prophesied a big future for this fruit. Thinking that there might be "money in the business," a fruit merchant introduced to the buyers of New York a shipment of four thousand bunches; but this initiatory effort does not seem to have met with much success. Ten years later, another consignment of ten thousand bunches was shipped from Jamaica, and no difficulty was experienced in securing a ready sale. Now, the trade in bananas between New York and the West Indies forms a special department of commerce, for which vessels are specially built and equipped.

The quantity of bananas shipped from West Indian and adjacent ports into the United States now amounts to thirteen or fourteen million bunches annually, valued at considerably over $20,000,000. Our own possession of Honduras exported, in 1880, bananas to the value of seven hundred pounds, while at present the annual value of this fruit exported is close upon fifty thousand pounds. From one port alone, on the shores of the Caribbean Sea, two hundred and fifty thousand pounds' worth of bananas are exported each year.

The fruit which finds its way to England comes almost entirely from Madeira and the Canary Islands. Before long, however, the West Indian banana will enter the field as a powerful competitor, the arrangements for the safe and speedy sea carriage of the fruit now rendering such a contingency quite feasible.

The bananas intended for export are cut when green, and consequently unripe, and carefully packed in long and loosely constructed baskets, or wooden crates. The bunches of fruit are incased in cotton wool, and while great care has to be taken to protect them from damp or frost, thorough ventilation must be maintained as well. On arrival at the fruit merchant's warehouse, they are stored in dry, airy rooms, the temperature of which is regulated by the condition of the fruit and the length of time it is proposed to keep it before placing it upon the market. Thus, fruit which is wanted to ripen slowly may be kept at a steady temperature of 55° to 60° Fahrenheit, while the ripening process may be easily accelerated by increasing the temperature. When properly ripe, the outer skin assumes that delicate canary hue which color experts maintain has no other exact parallel among the tints with which nature invests her vegetable products.—Richard Beynon, in Knowledge.

Dual Personality and the Double Brain.

A favorite theory with some speculative psychologists, and one which appears to be gaining ground, is that the two cerebral hemispheres are capable, to some extent, of independent activity. The theory has been evoked to account for those strange but well-established cases in which an individual appears to possess two states of consciousness—two personalities as it were—such cases as afford the basis of fact for Stevenson's weird romance of "Dr. Jekyll and Mr. Hyde." Dr. Lewis C. Bruce, in the last number of Brain, records a case which is more strongly in favor of the double brain theory than any, so far as we know, previously reported. The man was an inmate of the Derby Borough Asylum. He was a Welshman by birth, and had been a sailor by occupation. He was a lunatic, but his mental characteristics were very different at different times. In one state he was English, in the other Welsh. In the English stage he was the subject of chronic mania. He spoke English, but understood and could converse in Welsh. He was restless, destructive, thievish, and fond of playing practical jokes. He exhibited a fair amount of intelligence, wrote, drew pictures of ships, related incidents in his past life, recognized the doctors and attendants, and was bold and fearless in his manner. His memory, however, was a blank as to what occurred in the Welsh stage. Thus, on one occasion he burned his arm during the Welsh stage, but, passing a few days later into the English stage, he could give no account of how he suffered the injury. Yet he could remember events which had happened earlier in an English stage: for instance, a year later he could recall accurately particulars about Christmas decorations. He knew coins and their purpose, he recognized varieties of tobacco, and sought to obtain the weed by fair means or foul. He named the primary colors, and was pleased with the sound of a tuning fork. Taste, smell, and touch seemed to be unimpaired. His circulation was good (pulse of high tension), he had a good appetite, his bowels acted well, and he was very fond of his bath. Into the Welsh stage he passed either suddenly or by way of an intermediate stage; in the Welsh stage he was in a condition of dementia. He understood Welsh, but talked a gibberish in which, however, some Welsh words were recognizable; he did not understand English. He sat doubled up in a chair for hours, did not attempt to move at meal times, was sly and suspicious, did not recognize doctors or attendants, his circulation was weak, his extremities livid, his legs often edematous (pulse of lower tension). He suffered from constipation, disliked bathing, did not recognize coins or tobacco, was alarmed at the sound of a tuning fork, and appeared to have no power of discriminating by smell or taste.

As far as the symptoms so far mentioned go, it might be possible to explain the man's dual states, taking our clew from the fact that he retained some knowledge of Welsh in his demented stage, by supposing that some variation in the blood supply might have thrown in and out of action the more recently recognized centers, which, as the man was born Welsh, would be the organization for speaking English, while the Welsh part of the speech center would still remain capable of some, though a very imperfect, form of activity. This hypothesis, however, appears to be negatived by the fact that he was right handed while in the English stage, left handed in the Welsh stage. While in the intermediate stage, when this was observed, he was ambidextrous, and spoke a mixture of English and Welsh, understanding both languages. This fact seems to leave us no alternative but to conclude that in the English stage the left, in the Welsh stage the right, hemisphere was the more active. In the Welsh stage, when he attempted to write, the result was practically illegible, but he used the left hand and traversed the paper from left to right; in the English he wrote with the right hand from left to right, and rather more legibly. He could also write with his left hand, but then traversed the paper from right to left, and his writing had the characters of mirror writing—that is it could be read when held up to a mirror.—Brit. Med. Jour.

Conditions of Foreign Trade in France.

The commerce of France during the year 1895 has shown a diminution of 151,000,000 francs in the importations, and an increase of 309,000,000 francs in exportations, 208,000,000 of which are for manufactured articles; that is an increase of 158,000,000 francs in the total amount of exchange between France and other countries.

The commercial balance shows a deficit of 311,000,000 francs in place of the 728,000,000 of 1894:

	Millions of Francs. 1895.	1894.
Importations	3,699	3,850
Exportations	3,387	3,078

The total amount, therefore, for 1895 was 7,086,000,000, in place of 6,928,000,000 in 1894.

We also give below some statistics relating to the commerce of France with the principal countries.

IMPORTATIONS IN MILLIONS OF FRANCS.

	1895	1894
England	494	480
Germany	316	310
Belgium	308	371
Switzerland	65	66
Italy	114	121
Spain	207	174
United States	266	326
Brazil	73	56
Argentine Republic	177	168

EXPORTATIONS IN MILLIONS OF FRANCS.

	1895	1894
England	1,005	912
Germany	328	324
Belgium	515	477
Switzerland	163	129
Italy	139	98
Spain	113	108
United States	282	195
Brazil	80	80
Argentine Republic	44	50

—L'Illustration.

Cotton Seed Oil in Olive Oil.

For the detection of cotton seed oil in olive oil (to which it is equal for all practical purposes, but which those who wish to buy olive oil prefer to get without any admixture), the following table of colorations, etc., caused by treatment with various reagents, will be found interesting and profitable.

The first column gives the reagent employed; the second, the effect produced upon olive oil; and the third, that produced upon cotton seed oil.

REAGENT.	OLIVE.	COTTON SEED.
Nitric acid	Greenish	None.
Fuming nitric	Brown	Brown.
Sulph. 1·65 grav	Green	Red.
Sulph. nit	Green	Red.
Potash or soda lye	White	Violet.
Zinc chloride	Red	Brown.
Hydroch. acid and sugar	Yellow	Orange.
Calcium disulphide	Permanent gold	Permanent gold.
Tin chloride	At first yellow	Orange yellow.
	Result yellow or green	Yellow brown.
Sirup and phosph. acid	Cold, green	Gold yellow.
	Hot, colorless	Reddish yellow.
Mercuric nitrate	Alone, yellow	Pale yellow.
	With sul. acid, yellow	Pale chocolate.
Iodine degree	81·3	107·9.
	103·9	
Per cent caustic potash for saponification	18·93 to 19·26	19·10 to 19·66.

The Progress of Cremation.

The practice of cremation is increasing in France, but increasing very slowly so far as the general public is concerned. The furnace would often be idle were it not for the remains from the hospitals, which amount to from 2,000 to 2,500 bodies per annum. The apparatus employed is that of MM. Toisoul and Fradet, and works by means of gas with a recuperator. Incinerations are accomplished in an hour, or at most an hour and a quarter, and the cost of the combustible never exceeds three francs per operation.

Astronomical.

Our attention has been called to the fact that the article by Camille Flammarion in a recent issue of the SCIENTIFIC AMERICAN is in error in one respect. Mr. Alvan Clark is credited with being the maker of Mr. Lowell's objective. This beautiful glass is 18 inches in diameter, and Mr. J. A. Brashear, the well known optician of Allegheny, Pa., is the maker of the lens.

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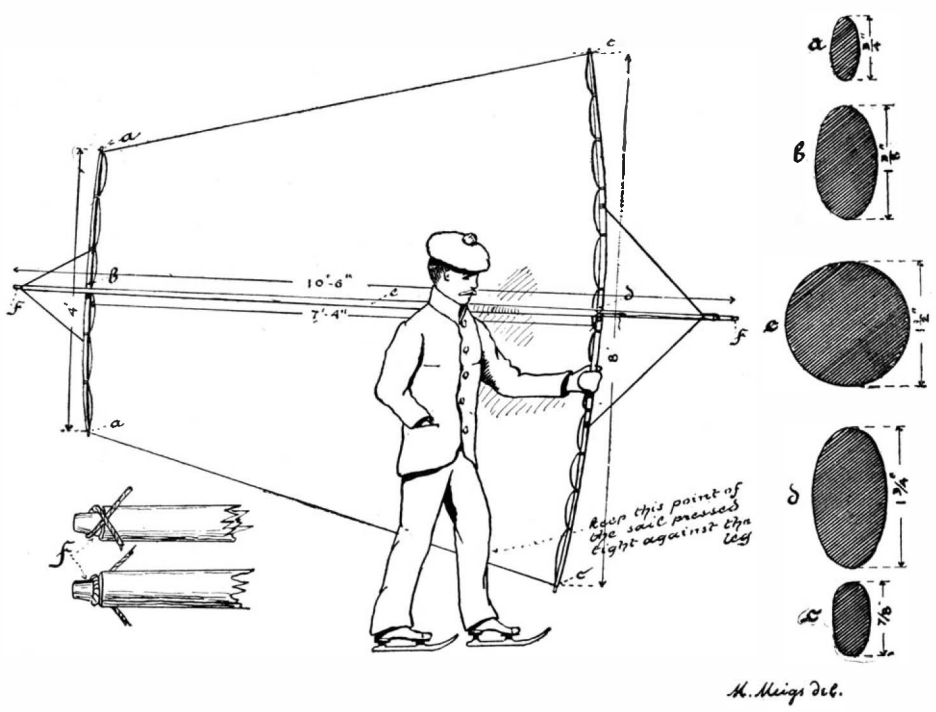
HOW TO SAIL ON SKATES.

The accompanying representation of an easily made sail, designed to add greatly to the pleasure of skating, is sent us by Mr. Montgomery Meigs, of Keokuk, Iowa, who styles it a Swedish sail, as it was introduced by a gentleman from Sweden. The spread of canvas is sufficient to afford considerable sport in even a moderate breeze. In tacking, the free hand is raised above the head and grasps the main spar above the horizontal mast, when the sail is quickly passed over the head to a similar position on the other or right hand side of the skater, the right hand then keeping hold of the spar instead of the left, as shown in the picture, and the mast resting on the right shoulder. Long racing skates are preferable, as they pass more easily over obstructions and give a better foothold on the ice. The cross sections show the full size of the mast and spars at different points. The halyards at the large end unite in a single cord that passes over a pulley let into a slot in the mast, and the end of this cord, when the sail is strained and fastened, is used to lash the mast and spar together.



SKATING WITH THE AID OF A SAIL SWEDISH SYSTEM.

Explosion of Gasoline.

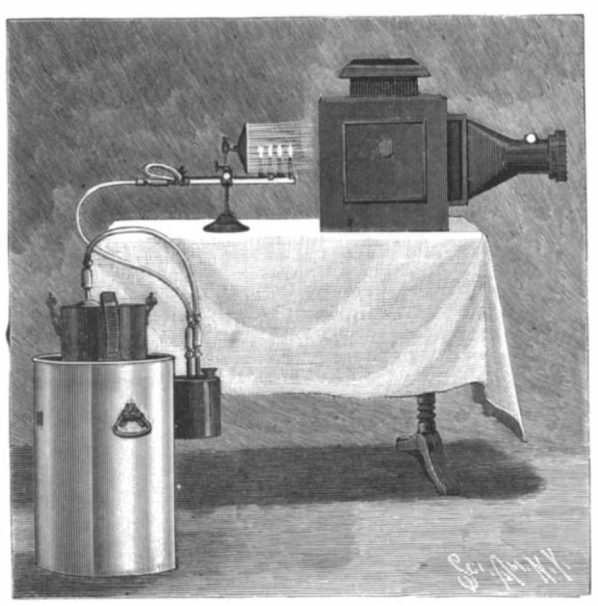
Gasoline is so largely used as a cleaning agent and insecticide that it is remarkable that there are not more serious accidents attending its use. Three persons were injured on February 15 by an explosion of gasoline in a sleeping car in the Pennsylvania Railroad yard at Pittsburg. The cleaners were renovating the upholstery with gasoline, when suddenly there was an explosion which hurled the occupants of the sleeper to one side, rendering them unconscious. The sides of the car were bulged out and the roof lifted off. Every window and door was blown from its fastenings. In fact, the car above the trucks was a wreck. Two adjacent cars were badly injured. The cause of the explosion has not been explained.

THE FULLER ACETYLENE APPARATUS.

While much has been published in the daily and technical press concerning the "new gas," acetylene, it is only those who have seen it who can realize what a wonderful illuminant it is. In it we have a gas producing the whitest light that any gas can develop, a light comparable with that produced by the oxyhydrogen burner, and so bright as to be available for magic lantern and other scientific work. One of the interesting features of acetylene is that it can be generated for use with compact apparatus.

The two illustrations represent the Fuller acetylene generator shown in use for scientific purposes. The generator, constructed largely on the principle of the Dabereiner lamp, is shown in the cuts, standing up on the floor. The outer vessel is a tank containing water and provided with a concentric core to reduce the quantity of water required to fill it. In this tank of water is inverted a gas-holder bell, whose top in the cuts is seen projecting above the tank. In the projecting top is inserted a second small bell of metal, which is made gas tight in its position by a water seal. This bell carries a suitable basket for holding carbide of calcium, and the proportions of the apparatus are such that when the gas holder is immersed in the tank, the latter containing the proper quantity of water, the carbide basket will be under water. If charged with carbide, gas will be rapidly generated, causing an increase of pressure within the bell or holder, with consequent depression of water. This depression causes the water to leave the carbide, and generation of gas ceases. Should this depression be insufficient to provide for the gases generated, the holder itself will rise until something like a cubic foot of gas will be accumulated. On the other hand, if the gas is drawn off, the pressure will fall, water will again rise and come in contact with the carbide, again generating gas.

Referring to the cuts, a small tank or vessel is seen attached to the side of the tank. This is a simple surface condenser cooled by water, the purpose of which condenser is to remove water from the gas in order that it shall be dry. Moreover, the gas, as will be seen, is collected from the very top of the bell. In rising to this point it comes to a certain extent in contact with the upper layers of the carbide, which in their turn act as a very efficient drier. Thus the gas is delivered in the best possible condition to the burners.



THE FULLER ACETYLENE STEREOPTICON BURNERS.

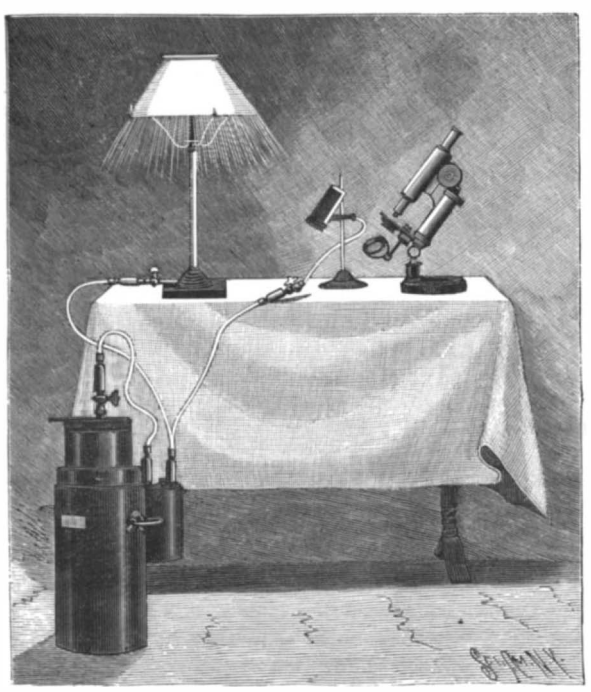
One of the cuts shows the apparatus in use for microscopic and reading purposes, the same generator supplying a special burner for the microscope and a standard reading light. Another cut shows a four flame burner for a magic lantern. In order to give the construction adopted, the burner is shown standing on the table and drawn back from its position in the body of the lantern.

This apparatus is the invention of Mr. H. F. Fuller, M.A., F.F.S.C., a well known scientific authority identified with the construction of apparatus of demonstration for many years. It is being manufactured by the Walmsley, Fuller & Company, 134 Wabash Ave., Chicago, Ill.

In the larger form of apparatus it is proposed to have the surface condenser supplied by a constant stream of water to condense the steam from the gas. In the smaller type of apparatus here shown this is found to be quite unnecessary.

To Clean Windows.

Choose a dull day, or at least a time when the sun is not shining on the window; when the sun shines on the window it causes it to be dry streaked, no matter how much it is rubbed. Take a painter's brush and dust them inside and out, washing all the woodwork inside before touching the glass. The latter must be washed simply in warm water diluted with ammonia. Do not use soap. Use a small cloth with a pointed stick to get the dust out of the corners; wipe dry with a soft piece of cotton cloth. Do not use linen, as it makes the glass linty when dry. Polish with tissue paper or old newspapers. This can be done in half the time taken where soap is used, and the result will be brighter windows.—Business.



THE FULLER ACETYLENE GENERATOR IN USE FOR READING AND MICROSCOPY.

Marvelous Growth of American Iron and Steel Production.

The directory of the iron and steel works of the United States, which is published every two years, has just been issued. Its contents bear very striking testimony to the expansion of a department of national industry which has reached proportions unequaled in any other country of the world. Twenty years ago, says the Boston Herald, the capacity of the blast furnaces of the United States was 4,856,455 tons; to-day it is 17,373,637 tons. But for the output of 1876, 713 furnaces were required, while for that of 1896, 469 furnaces are adequate. The average annual capacity of the blast furnace of twenty years ago was 6,811 gross tons, while to-day it is 37,044 tons. A still more striking evidence of the revolution that has taken place in the methods of iron production may be found in the fact that the four new furnaces now being constructed for the Carnegie Steel Company will have an aggregate annual capacity of 700,000 tons, or 175,000 tons each. These will be the largest furnaces in the world, and it is significant of the change that has come over the trade since 1894 that, while in that year not one new furnace was building in this country, there are to-day, beside these gigantic four, twenty other new furnaces either in construction or projected. A steadily decreasing number of blast furnaces use charcoal, the proportion being reduced to less than 6 per cent of the whole; for the rest coal and coke serve as fuel. The directory enumerates and describes 505 rolling mills and steel works, the annual converting capacity of all the standard Bessemer steel plants in January last, built and building, being 9,472,350 tons of ingots and direct castings, against 7,740,000 tons in January, 1894. Of the open hearth steel plants at work or in construction, the annual capacity is 2,430,450 tons, against 1,740,000 tons two years ago. It thus appears that, while the increase in the capacity of the Bessemer steel plants has been 18 per cent in two years, that of the open hearth steel plants has been 28 per cent. Evidence of the production-restricting policy of the nail trust will be found in the fact that while in January, 1892, there were sixty-five rolling mills devoted in whole or in part to the manufacture of cut nails and spikes, and containing 5,546 nail machines, the number had decreased by January, 1894, to fifty-five mills and 5,094 machines, and in January, 1896, to fifty-three mills and 4,598 machines. A decrease of 948 nail machines in two years side by side with a great increase of capacity in every other branch of the iron and steel industry is a fact replete with significance, and to be only partially offset by the increased output of the wire nail works.

It further appears from the directory that there are seventy-four iron and steel bridge building works in the United States, twenty-two locomotive works, thirty-six iron and steel shipbuilding yards, sixty-four completed car axle works and two building, 112 completed car wheel works and one partly erected, and 112 car building works. In addition to these, there are thirteen horse nail works, eighty-two malleable iron works, seventy cast iron and cast steel pipe works, and thirty-eight wrought iron and wrought steel pipe, iron and steel riveted pipe and seamless tube works. These are but part of the many establishments in which the cruder iron and steel materials are taken up and developed into more or less finished products, but even their bare enumeration gives an impressive idea of the magnitude of this branch of American manufactures.

SECRETARY HERBERT has requested from Congress an appropriation of $50,000 to enable the Navy Department to test methods of throwing high explosives from guns on board ship with ordinary velocities.

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RECENTLY PATENTED INVENTIONS.

Engineering.

STEAM GENERATOR.—Cecil R. Benton, Vergennes, Vt. According to this improvement pairs of tubes are placed one within the other, there being an annular space between the tubes for the water and steam, with individual heads for each pair of tubes. The heads have internal recesses communicating with the spaces between the tubes, there being nipples for connection with the tubes and with the water and steam pipes, and one of the heads having a stuffing box through which the inner tube plays. With this generator steam is quickly made, and the pressure is uniform, owing to the equal transformation of water and steam.

Railway Appliances.

CAR WINDOW.—Francis W. Wilson, New York City. To keep car windows normally tight, while yet enabling them to be easily opened and held in any desired position, this inventor has devised a casing having a fixed and a movable guide at each side of the sash, there being a connection between the movable guides, while a stop pivoted at the base of the frame is adapted to swing in position to engage the lower part of the sash, a spring connected to the stop holding it normally in operative position.

CAR FENDER.—Clara M. Beebe, Elmira, N. Y. This is an improvement on a formerly patented invention of the same inventor, a basket being supported in front of the car and co-operating with a shelf to be projected foward by springs that are held under control by retaining devices. The device is designed to be very simple and inexpensive, and well adapted to prevent persons being jammed under and injured by the fender, and also preventing an arm or limb from being dragged beneath the buffer.

Mechanical.

TOOL HOLDER.—John S. Norton, Ogden, Utah. For use on lathes and similar machinery this inventor has devised a tool holder consisting of a bar adapted to be fastened to a tool post and having a vertical inclined opening for the passage of a tool, and also having a recess communicating with the tool opening and an opening in the side of the bar. A gravity pawl fulcrumed in the bar is adapted to engage the shank of the cutting tool.

MAKING WELDLESS CHAINS.—Hippolyte Rongier, Gartsherrie, Scotland. This is an improvement on a formerly patented invention of the same inventor for machinery for making weldless stayed chains from a cruciform bar of steel by cold punching, the present invention reducing the number of separate punching operations to bring the bar to a roughly formed chain, the passage of the bar through a single machine now dispensing with five different operations, and the punching being so performed as to dispense with subsequent trimming of the ends of the links.

Miscellaneous.

CARPET STRETCHER.—William G. Bertram, New Rochelle, N. Y. This is a simple device for conveniently stretching and holding a holding a carpet in stretched condition while being tacked, the carpet layer being permitted to use both hands freely to tack and straighten the carpet. The device consists of two parts adapted to move one on the other, and having at opposite ends means for engaging the floor and the carpet to be stretched. One of the parts has serrations engaged by an operating lever, a pawl holding the parts in position when moved.

POCKET COMPANION.—Frederick W. Bacho, Mobile, Ala. This is a device but a trifle larger than an ordinary pencil holder or fountain pen, and adapted to contain a variety of useful articles which may be readily brought to position for use, as a pen and pencil holder, a measuring tape on a spindle, a rubber eraser, a whistle and a knife blade, a calendar, and several small toilet articles.

MECHANICAL CASH BOOK.—Alonzo D. Smith, New Woodstock, N. Y. This improvement comprises a casing made in two hinged sections to open and close like a book, each section having a series of guideways for slides indicating between reading bars the date and amount received, one of the sections representing the credits and the other the debits. It is a simple and durable device, easily operated to indicate the amounts of money received and paid out.

GAS METER.—Edward D. Mitchell, Brooklyn, N. Y., and John Hearne, New York City. These inventors provide improvements in mounting the flag wires, whereby they are made capable of easy movement while being thoroughly gas tight, the case being also improved so that it may be more economically made and not be liable to chafe or wear out the leathers, and improved means being devised for mounting and guiding the valves of the meter.

GAS PIPES AND CONNECTIONS.—Christian Weuste, Mulheim-on-the-Ruhr, Germany. This inventor has devised an apparatus for closing and opening gas connections of all kinds by transmitting liquid from two vessels communicating with one another into an inclosure in connection with the gas pipes, the object being attained by an increase or decrease of the pressure in the pipes. The improvement comprises a bell having a gas inlet and dipping into a connected vessel having a liquid seal, another seal receiving liquid from the seal, while the second seal communicates with the bell to receive gas, and a gas outlet leads from the second seal.

WIND WHEEL.—Ninian H. Dolsen, Hessel, Mich. This is a compound wheel with a front wheel having inclined vanes revolving in one direction while the other wheel has buckets facing and revolving in the opposite direction. The two wheels are cylindrically incased to confine the air against centrifugal action and insure delivering the air from the front to the rear wheel. The construction is simple and the wheel is designed to develop great power for its size.

HANDLING FENCE WIRE.—John B. Crowder, Talucah, Ala. An improved apparatus for removing fence wires and putting them up has been devised by this inventor, comprising a carriage having a shaft supporting a spool, a ratchet drum engaged by an operating lever and a pivoted and adjustable guide frame. By this means wire may be stretched to any desired degree in erecting the fence, and when a fence is to be taken down the wire may be rewound upon its spool and readily stretched in place at some other location.

CLOTHES RACK.—Granville Bartlett, Rushville, Ind. This is a light wire construction adapted to be readily folded in small space and which, in slightiy modified form, may also be used as a vine rack, wider at the top than the bottom, and especially adapted to support tomato vines, giving the fruit plenty of room to ripen. The bottom ends of all the upright portions or legs of the frame are bent to form feet, and connecting wires forming cross bars are out of vertical alignment to accommodate more clothes.

PRESERVING GRAPE JUICE.—Charles Staubes, San Jose, Cal. To preserve grape juice unfermented, making a palatable beverage resembling wine, but without any alcohol, and its medicinal qualities being unimpaired, this inventor has devised a process which consists in mixing the juice with benzoate of sodium in a sulphured cask and adding common salt, afterward transferring the juice to other sulphured casks and adding benzoate of sodium, and, finally, again transferring the juice to clean sulphured barrels, exposing it during transfer to the air and adding Spanish clay, salt, horse radish root and tannin.

Designs.

BUTTON.—Dennis C. Fauss, New York City. This is an oval button with central circular portion, from which project radial stellated lines, the central portion containing a monogram.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

CAMBRIDGE NATURAL SCIENCE MANUALS. Physical Series. Mechanics, Statics, Hydrostatics. An elementary textbook, theoretical and practical, for colleges and schools. By R. T. Glazebrook. Cambridge: University Press. 1895. Pp. xiv, 244, 176, 208, xxiv. Price $2.25.

This exceedingly attractive book we find ourselves called upon to strongly commend. Modern physical science is now so largely based on the laws of mechanics that the best possible introduction to it is a study of mechanics, pure and simple. Here we find mechanics admirably treated in the aspect of the mechanics of statics and dynamics, and then in the same book we have a treatise on hydrostatics. It will be observed that the paging is not consecutive—dynamics, statics, and hydrostatics each having a separate manual, in this case bound together. At the end of the book are put three indices, one for each subject. A limited number of problems are given, exemplifying examination papers just enough to give the English aspect, which, of course, is not an improvement for this country. The answers to the problems are also contained.

THE AERONAUTICAL ANNUAL. 1896. Edited by James Means. Boston: W. B. Clarke & Company. 1896. 8vo. Pp. 158. Illustrated, plates. Price $1.

This is the second year of publication of an annual "devoted to the advancement of the neglected science." It contains most interesting papers on aerial flight and matters connected therewith, by such writers as Otto Lilienthal, Hiram S. Maxim, O. Chanute, William H. Pickering, J. B. Millet and others. The paper of Otto Lilienthal was given in the issue of the SCIENTIFIC AMERICAN for March 7, 1896. The editor of the annual notes that Mr. Maxim considers that petroleum motors will be a leading factor in the aerial navigation of the future, as no other substance which can be obtained on a commercial scale contains such a quantity of latent energy. The publication contains a vast amount of useful information on the subject of aeronautics, and, as the profits of this edition will be given to the Boston Aeronautical Society, to be added to its experimental fund, it is doubly worthy of a large sale.

HANDY GUIDE TO PATENT LAW AND PRACTICE. By George Frederick Emery. London: Effingham Wilson, Royal Exchange. 1896. Pp. xxiv, 312. Price $2.50.

This little manual is devoted to English patent law and will form very interesting reading for American patent lawyers, enabling them to see how the law of England, perhaps less codified than ours, operates in the protection of the rights of inventors. It is thorough, clear and well printed, and should, we think, attain extensive use in this country. It is a great mistake to limit our reading to matter relating immediately to our work, the most valuable ideas being often obtained by the study of the methods of other countries. In England, as before mentioned, codification has not been as extensively indulged in as here, yet we do find codification in this book in an appendix devoted to it, which appendix furnishes an example of the power of that distinguished and peculiar body, the English Board of Trade. It will be noticed that examinations will be required, or a proof of qualifications, before an agent is allowed to practice in England. This is something which some think might well be introduced here, and which is analogous to our practice in admitting to the bar.

ALDEN'S LIVING TOPICS CYCLOPEDIA. A record of recent events and of the world's progress in all departments of knowledge. New York: John B. Alden. Price 50 cents.

This volume covers matter running from A to Boy, the life of Boyesen being the last topic, except the appendix, in which several other topics are given, in order to keep the book well up to date. The idea of this work is that the information sought in an encyclopedia is wanted more for the last three years than for any other time, and accordingly in this work the field of the world's recent progress is gone over and the topics are alphabetically treated. At the end of a definite period the book will be complete and the ground will be open for the opening of another. Annual encyclopedias have obtained a great popularity, and this little one, giving dates and numerous statistics will be found of considerable value to all. For instance, among biographical topics we find Barnato, the great English promoter, and, of course, when "J" comes out, Jameson will be given. The scope of the work in science and its freshness, too, is shown by the inclusion in it of argon and astronomy.

GAS MANUFACTURE: THE CHEMISTRY OF. A practical handbook on the production, purification and testing of illuminating gas, and the assay of the by-products of gas manufacture. For the use of students, chemists, and gas engineers. By W. J. Atkinson Butterfield. With numerous illustrations. London: Charles Griffin & Company, Limited. Philadelphia: J. B. Lippincott Company. 1896. Pp. xiv, 375. Price $3.50.

An up to date book on gas manufacture will be well received by all gas engineers, who seem to have been somewhat neglected by the authors of technical manuals. This work is fully up to date, the best indication of which is that acetylene is treated in it, which certainly is the last development of gas industry; and incandescent burners are also quite fully treated. Photometry receives quite adequate description and problems of analysis, such as the determination of sulphur, are treated with comparative fullness. Illustrations are used where required, and the subject throughout is creditably presented. The size of the work is such as to make it agreeable for reading, the tendency in the past, inaugurated by Clegg's treatise, having been to make books on gas manufacture of awkward dimensions.

A TEXTBOOK OF GAS MANUFACTURE FOR STUDENTS. By John Hornby. London: George Bell & Sons. New York: Macmillan & Company. 1896. Pp. xii, 261. Price $1.50.

We have just reviewed an extensive treatise on gas manufacture. Here we have a briefer one, designed for students' use, especially for students preparing for examinations for the "City and Guilds of London Institute," and, of course, that imposes on it the usual limitations which we have often deplored. In other words, there seems to be a large amount left out that should have been noted. Such as it is, however, it is well prepared and well printed.

CHEMISTRY FOR ENGINEERS AND MANUFACTURERS. A practical textbook. By Bertram Blount and A. G. Bloxam. With illustrations. Volume 1. Chemistry of Engineering, Building and Metallurgy. London: Charles Griffin & Company, Limited. Philadelphia: J. B. Lippincott Company. 1896. Pp. x, 244. Price $3.50.

This work, of which we have only the first volume before us, is somewhat of an innovation, it being based on the idea of giving applied chemistry with reference to specified branches of industry. How far successful such a work can be is more or less doubtful if it is to be used by one who depends upon it entirely for science, but to an educated engineer such a book will be most useful, and is to be highly recommended. The second volume is to go into the chemistry of manufacturing processes, so that after all the work takes the shape largely of a technology.

SYNOPSIS OF CURRENT ELECTRICAL LITERATURE. Compiled by Max Osterberg. Electric Power, New York. New York: D. Van Nostrand Company. 1896. Pp. xiii, 143. Price $1.

This is the first publication of this kind in the English language. It gives a brief synopsis of the principal papers on electrical topics which have appeared during the past year, one by one, and after each topic it gives the name of the publication in which it appeared and the date. The use of all this is evident. One finds in this book a resume of what has been written on the various specific subjects relating to electricity, and the synopsis accordingly indicates which books will be of value, and it also tells where they are to be found. Mr. Osterberg has done a most valuable piece of work, and it would be poor criticism to attempt to find deficiencies in it. We hope that it will receive so warm a reception that it will give its author encouragement to continue it from year to year.

PRIZE ESSAYS ON SPINNING, AS THEY APPEARED IN THE WOOL AND COTTON REPORTER. Whitinsville, Mass., U. S. A. Purchased and now published by the Whitinsville Spinning Ring Company. Pp. 91. Price $1.

Four prize essays are given in this work, all, of course, very technical, and for that reason, probably, of greater value to mill people. They are the results of a contest including twenty competitors. The portraits of the authors are given.

THE CONSTITUTION AND FUNCTIONS OF GASES, THE NATURE OF RADIANCE AND THE LAW OF RADIATION. By Severinus J. Corrigan. St. Paul: Pioneer Press Company. 1895. Pp. viii, 46.

This work, treating of the constitution and function of gases, is not one that lends itself to review. It presents the author's views and is extensively elucidated by mathematics.

THE MODERN WIZARD. By A. Roterberg. Published by the author. Pp. 120. Price $1.

Books on magic seem always to be attractive. The present one purports to give modern tricks, and would act rather as a supplement to existing books than as a substitute for them or a rival to them.

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The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, $4, Munn & Co., publishers, 361 Broadway, N. Y.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(6783) **Novice writes:** On page 83 of your No. 6 we find rule No. 16 of the National Board of Fire Underwriters offered to people who are about to employ electric lighting: "Current from street railway wires should never be used for lighting or power in any building, as it is extremely dangerous." Please inform your readers, many of whom are no doubt using current from street railway wires, as well as yours truly, in what consists the extreme danger in such cases. A. The high voltage may be supposed to render it dangerous. Exactly how this should affect fire risk is not very clear.

(6784) **A. L. writes:** I have made a small dynamo. The fields each contain 44 pieces of sheet iron, separated by paper wound with No. 14 wire, 9 layers and 23 coils in each field. The ring armature contains 44 pieces of sheet iron, and has 6 teeth wound with No. 18 wire, 16 turns of wire on each. It is two inches in diameter, and the sheet iron sections are insulated with paper sections between. This dynamo was intended to operate as a dynamo or as a motor. It produces sufficient current to decompose water, but I cannot make it cause a 16 candle power lamp to glow, though I have run the dynamo at more than 4,000 revolutions per minute. Would you advise rewinding it? If so, please say what size wire would be best to give a 16 candle light? I would prefer not to rewind it. Would you advise the use of an induction coil or transformer? If so, please advise me how to construct one suited to this dynamo in your Notes and Queries column. A. Your description is very meager; probably your dynamo is too small for the 16 candle power lamp. Try it on a smaller one of low voltage. You will, in any case, have much trouble, on account of the soft iron core. An induction coil or transformer will be of no value for it.

(6785) **A. C. B. says:** Can you give me formula in your notes and queries to laundry lace curtains, without stretching with pins or on frames? A. Shake every curtain, or hang them on a line and brush them down with a soft hair brush. Prepare a soaking liquid by dissolving a small quantity of borax in warm water, soak for an hour or two, then squeeze between the hands to remove the superfluous water. Take some good soap and chip it in hot water; stir until all the soap is melted, and a fine lather produced. By this time the water will be moderately warm. Immerse the curtains in this, pass them repeatedly through the lathered water, or work them up and down. Rubbing should be avoided; when absolutely necessary, do it gently and without a brush. Squeeze out the soapy water, and rinse in plenty of soft, warm water. Wring carefully. Curtains should be dried quickly. If in the country, they

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may be spread to dry on clean grass. Otherwise curtains are always better for being stretched and pinned to wooden frames while drying. It is advisable to use cooked starch for curtains. Use good starch, mix it thoroughly in warm water, which should be made to boil for fifteen or twenty minutes. While cooling add a very little indigo blue. This is only to be used for pure white curtains. The starch should be decidedly thick. Draw the curtains through the starch, squeeze out gently, and dry rapidly.

(6786) F. A. H. says: 1. Can asbestos be made in liquid form or solution? If so, please give formula. A. It is impossible to get asbestos into a liquid form except by fusion. 2. Is there a cement or paste with which a meerschaum article can be mended? If so, please name ingredients. A. Dissolve casein in a solution of waterglass (sodium silicate) and stir into it calcined magnesia and use at once. Casein is prepared by allowing perfectly skimmed milk to stand until it curdles, when the casein is filtered out and washed on the filter. To simplify above a little fresh cheese may be boiled in water and mixed with slaked lime and ashes, using 10 parts cheese, 20 parts water, 2½ parts lime, and 2 parts wood ashes.

(6787) F. A. L. says: Can you, through the columns of your valuable paper, tell me of a simple method of blackening brass for the fittings of a lens and other camera fittings? A. The dead black on optical instruments is produced by dipping in a solution of chloride of platinum. To make this, take 2 parts hydrochloric acid, 1 part nitric acid, mix in a glass bottle and put in as much platinum foil as the acid will dissolve when placed in a warm sand bath, or, to hasten the solution, heat to nearly the boiling point of the acids. 1½ ounce nitric acid and 1 ounce hydrochloric acid will absorb about 30 grains platinum, but in order to neutralize the acid, it is better to have a surplus of platinum. Dip the article or brush in the chloride.

(6788) C. G. asks: Will a pair of oval or elliptical cog wheels work smoothly, like round ones, if they are cut right? If so, where could I get a pair? Can you tell me on what class of machinery they are used? That would give me an idea as to where to get them. What book can I get on gearing (some simple book)? A. Elliptic gearing will run fairly smooth if properly cut. They are used where irregular motion is required. Elliptic and other irregular gearing is described and illustrated in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 2 and 141, Differential Gear Wheels in Nos. 134 and 419, Planetary Wheel Trains in Nos. 419, 437, 441, 451, 470, 482, 359, a very complete illustrated description of special forms of gearing, 10 cents each mailed.

(6789) S. R. writes: I have built the 8 light dynamo No. 600, and would like to ask you a few questions, as follows: 1. What is the proper thing to use to connect the brushes? Is it necessary to have regular brush cable, or will a single wire do? A. Use cable or wire; cable is preferable. 2. Should ends of brushes be beveled, so as to lap from one segment to another? A. Bevel the ends, not enough to touch more than two segments at once. 3. What would be the best and cheapest power for same? A. A steam engine. 4. Please state what appliances I need for lighting my store from this machine. I want to get along with as little apparatus as possible. A. A switchboard, rheostat and safety fuses, or automatic cut-out. The engine must be accurately governed as regards speed. 5. Is there any particular danger of fire from this machine; that is, would you have to use the same precaution that you would for a larger plant? A. Not if you use extra large wires. Omit no precautions.

(6790) C. H. D. says: 1. How can I make dry plates for photography? A. You will find an article on dry plate making in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 541. Mailed on receipt of 10 cents. Amateurs seldom make plates except as an amusement. 2. Can I make a positive from a negative plate by placing the film of a plate against the film of a developed negative plate, and expose so that the light shines through the negative? A. You can make a positive in the way you mention; the exposure must, however, be very short; daylight is too strong. Use transparency plates, with artificial light, and expose for a few seconds only. Special plates are made by the plate makers for positives.

(6791) G. H. T. asks: Will somebody in the SCIENTIFIC AMERICAN office kindly give me a recipe for a good substantial whitewash for the outside of buildings? I saw such in a copy of your paper years ago, but have no means of getting at it now. A. Whitewash, United States Government.—The following coating for rough brick walls is used by the United States government for painting lighthouses, and it effectually prevents moisture from striking through: Take of fresh Rosendale cement, 3 parts, and of clean, fine sand, 1 part; mix with fresh water thoroughly. This gives a gray or granite color, dark or light, according to the color of the cement. If brick color is desired, add enough Venetian red to the mixture to produce the color. If a very light color is desired, lime may be used with the cement and sand. Care must be taken to have all the ingredients well mixed together. In applying the wash, the wall must be wet with clean fresh water; then follow immediately with the cement wash. This prevents the bricks from absorbing the water from the wash too rapidly, and gives time for the cement to set. The wash must be well stirred during the application. The mixture is to be made as thick as can be applied conveniently with a whitewash brush. It is admirably suited for brickwork, fences, etc., but it cannot be used to advantage over paint or whitewash.

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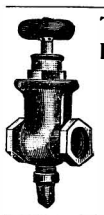

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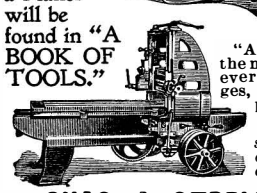

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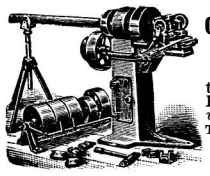

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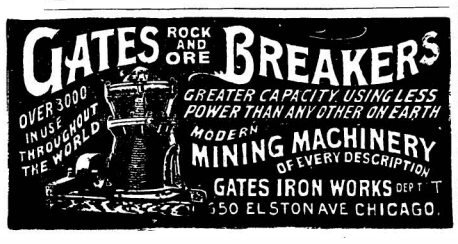

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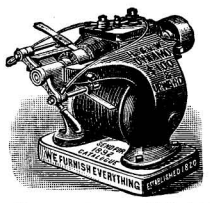

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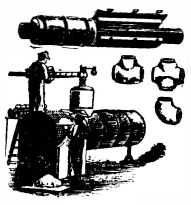

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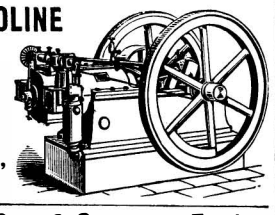

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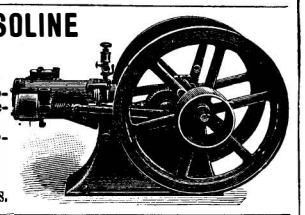

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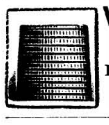

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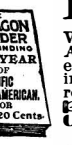

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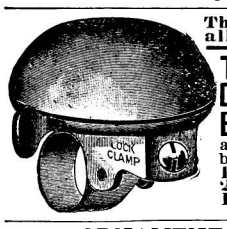

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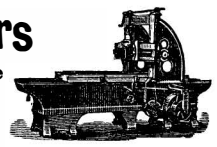

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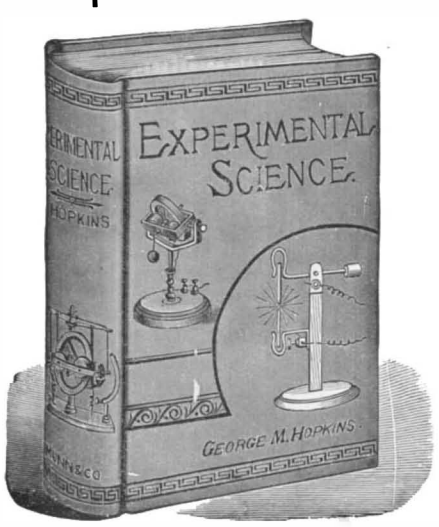

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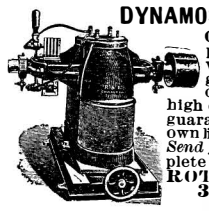

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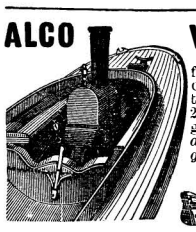

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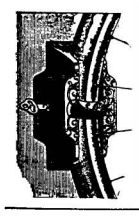

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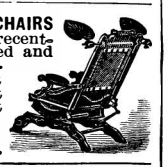

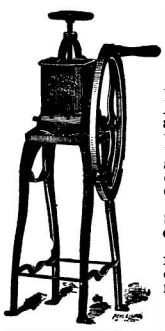

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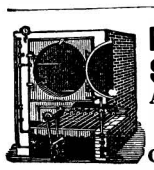

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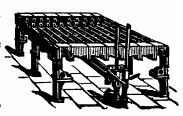

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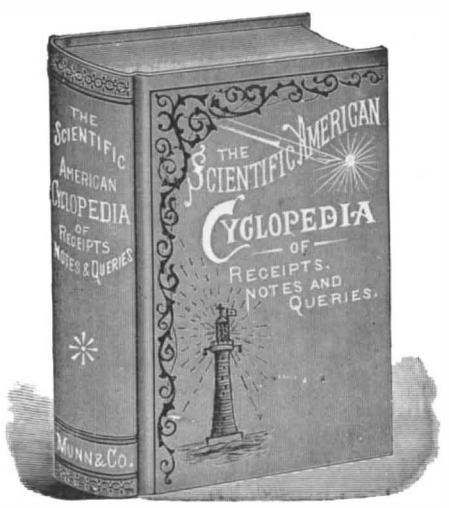

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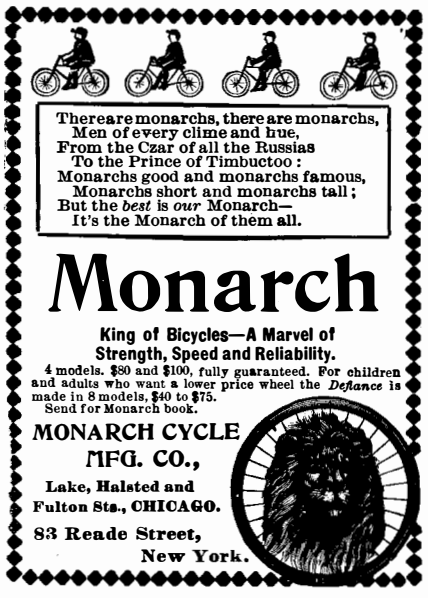

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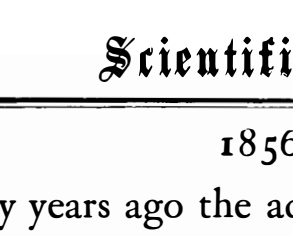

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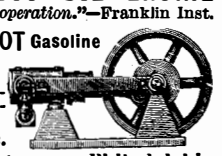

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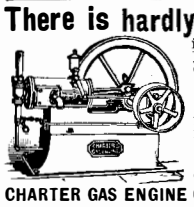

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